Engineers Australia
Engineering Heritage Victoria

Nomination for Engineering Heritage Recognition
under the
Engineering Heritage Australia Heritage Recognition Program
for the

Stawell Water Supply

May 2014

Front Cover Photo

Image shows intact fluming and syphon linking Fyans Creek to the tunnel under the Mount William Range.

Image: Flickr Rf_toaster, Stawell Water Supply Walk 2014 IMG_7277, February 17th 2014

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1.0 Introduction

The Stawell Water Supply represents a significant engineering achievement at a time when provision of a suitable water supply was necessary for the development of a gold rich town, and at a time where modern engineering technology, such as topographic maps, were unavailable to those designing the system.

When gold was discovered in the Stawell area in the 1850s, the need for a reliable water supply became readily apparent. Initially, two large dams were constructed in order to meet this need, however limited catchment area and pollution from the nearby mines contributed to the failure of this system. Consequently, construction of the current system, which diverted water from the Grampians-fed Fyans Creek, commenced in the early 1870s.

The Stawell Water Supply has undergone a variety of improvements aimed at modernising the system since its completion in 1881. However, some of the components of the original water supply system are still in operation today, and play an integral part in ensuring water is supplied to the township of Stawell.

The Stawell Water Supply has been nominated for recognition under Engineering Heritage for the following reasons:

1) A one kilometre tunnel under the northern side of the Grampians. Construction of this tunnel was carried out with the two ends of the tunnel meeting with high precision. The tunnel is still in service today as part of the modern Stawell Water Supply system, and despite one minor rock fall in 1988, remains in excellent condition
2) Wooden fluming, which was later replaced by more bushfire resistant steel fluming, extended some 12 kilometres from Fyans Creek to the entrance to the tunnel. The flume passes through heavily vegetated ragged country making construction and maintenance access difficult.
3) A weir, constructed at Fyans Creek, having the purpose of diverting water from Fyans Creek along the fluming. This weir was later replaced by a newer version at the same site; however fragments of the original weir are still visible today.
4) Construction of two large dams in the Stawell town area. These two dams formed the initial town water supply prior to the gravity fed system extending from Fyans Creek. These storages included the John D'Alton Storage, which was previously known as the No. 1 reservoir, and having a capacity of 11 megalitres. The John D'Alton storage still exists in changed form today, as it is the location of a recently constructed new water storage tank.

2.0 Heritage Award Nomination Letter

The Administrator

Engineering Heritage Australia

Engineers Australia

Engineering House

11 National Circuit

BARTON ACT 2600

Name of work: Stawell Water Supply

The above-mentioned work is nominated for an award under the Engineering Heritage Recognition Program.

Location, including address and map grid reference if a fixed work: Between Fyans Creek, south of Halls Gap in the Grampians, and the town of Stawell, a total distance of about 35 km.

Owner (name & address): Grampians-Wimmera-Mallee Water (GWMWater),

GWMWater

Regional Administration Centre

11 McLachlan Street

Horsham Vic,

PO Box 481, Horsham, Victoria 3402

The owner has been advised of this nomination and a letter of agreement is at Appendix 9.

Access to site: Old flume sites and the western end of the tunnel can be accessed via a 4WD track in the Mount William Range. The eastern end of the tunnel and the pipeline route to Stawell can be accessed by 2WD vehicle. The service reservoir at Big Hill is in an accessible area of parkland. The Diversion Weir is located just off a major public road and is accessible.

Nominating Body: Engineering Heritage Victoria

Owen Peake
Chair, Engineering Heritage Victoria
Date: 25 May 2014

3.0 Heritage Assessment

3.1 Basic Data

Item Name: Stawell Water Supply

Other/Former Names: None

Location: Between Fyans Creek, south of Halls Gap in the Grampians, and the town of Stawell, a total distance of about 35 km

Address: Grampians Road approximately 9.5 km south of the Lake Bellfield viewing area car park, Tunnel Road and Pipetrack Road between the Mount William Range and Stawell

Suburb/Nearest Town: Stawell

State: Victoria

Local Govt. Area: Northern Grampians Shire Council

Owner: GWMWater, PO Box 481, Horsham, Victoria 3402

Current Use: Public water supply

Former Use: Public water supply

Designer: John D'Alton, Stawell Borough Engineer, the scheme was first suggested in 1873 by John D'Alton. This scheme was approved by the Government's Chief Engineer of Water Supply, Mr G Gordon in 1874.

Maker/Builder: The Borough Council and the government set the plans for the water scheme in motion in 1873. Contractors were hired by the Borough Council. It was soon found that the progression of the works was too slow as it was difficult to obtain large government loans required to fund the scheme. The total cost of the scheme was £115,583, of which £108,506 was borrowed from the government.

Year Started: 1875

Year Completed: 1881

Physical Description: Gravity fed public water supply for the Town of Stawell, consisting of a diversion weir at Fyans Creek, about 10km of open fluming, a kilometre long tunnel, 24.2km long pipeline and service reservoirs within Stawell.

Physical Condition:

By components: (refer to appendix 2 for images of components)

- **Diversion Weir**: Still in service but original design was replaced to suit supply needs. The new weir is still located at the same site and old components of the original weir can still be seen a few metres upstream at the bottom of the creek.
- **Flume system:** Sections of the old steel fluming have been found as well as stone and timber supports. The steel has weathered and rusted, but is still intact. The original timber fluming and timber aqueduct no longer exists, as it was replaced between 1901 and 1910 with the steel fluming after the system burnt down from numerous bushfires.[1] The sections of steel fluming were constructed using 2-3mm [2] thick sheet steel, formed into trough

[1] Water Famine in Country Districts. 1898. *The Age*, 11th February, p. Page 2.

[2] Probably originally 1/8 inch plate.

segments with a width of 600mm and a depth of 200mm. These segments were joined with hand hammered steel rivets [3].

- **Syphons:** One original syphon, near the tunnel entrance, has been found. The syphon has remained intact at the flume end but has been damaged near the tunnel's entrance. The original syphon pipeline is not in service but has lasted well over time. The pipe is made of 300 mm diameter cast iron and is still mostly intact.
- **Tunnel:** Original tunnel is still in service and has barely been altered since it was first constructed in the 1880s. After a rock fall in 1988 at the entrance of the western end of the tunnel, a 20 metre length of iron pipe was installed. The entrance of the tunnel is now very small and narrow due to weathering over time and the use of the newly installed iron pipe. The tunnel now also has a corrugated steel roof support and a raised floor at the entrance to accommodate for the entry pipeline. [4]
- **Pipeline from tunnel to town:** There may be remaining fragments of the original pipeline, still in service. The current replacement pipeline is located between 60 and 90 cm underground and made of 450 mm ductile iron, concrete lined pipe.
- **Service Storages:** Still in service. The original service reservoir, built in the 1870s is no longer in use but is currently the site of a new steel water storage tank that has been constructed within its walls, as located on Big Hill in Stawell. The valve house is built into the embankment of the original reservoir. The rest of the water that is brought into Stawell is stored in three earthen storages (constructed between 1940 and 1984) on Big Hill. These water storage reservoirs and tanks have a total capacity of 500ML.[5]

3.2 Modifications and Dates

Since the need for a water supply system to the gold rich area of Stawell was decided upon in 1860, the Stawell Water Supply has undergone a variety of modifications and improvements, [6] and these are listed below:

1875 – Work began on both ends of the tunnel through Mt William Range on February 18th. The day was recognized as a public holiday in the Stawell District, with over 1000 people present as construction commenced.

1877 – January marks the time in which pipeline from the tunnel to the township was laid. The piping was laid as part of a gravity system and was completed within 4 months. Simultaneously, excavation begins for a service reservoir at Big Hill.

1878 – Wooden fluming, supported on high wooden trestles at each creek crossing, was constructed in 1878. At this point the system was very much incomplete, however water was allowed to percolate from within the range and flow along the fluming until it reached a distribution tank, set up at the entrance to the tunnel site. Water was held in this distribution tank, to be piped to Stawell once construction of the tunnel had been completed.

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[3] John Tottenham suggests that the flume may have been protected by bitumen paint.

[4] Russell, G. 2009. *125th Anniversary Celebration Stawell Water Supply Commencement of Works, 18th February, 1875*. North Melbourne: Australian Scholarly

[5] Vines, G. 2004. *Stawell Water Supply Scheme, Grampians National Park, Heritage Action Plan*. Biosis Research Pty Ltd.

[6] Russell, G. 2009. *125th Anniversary Celebration Stawell Water Supply Commencement of Works, 18th February, 1875*. North Melbourne: Australian Scholarly

1880 – The two ends of the tunnel met with high precision.

1881 - Completion of the flume line to west end of the tunnel results in the end of construction after six years. The project came at a cost of 115,000 pounds, with the Government covering a large portion of the cost.

1901 – Given the risk of bushfires in the Stawell area, supports for the flume line were replaced with stone pillars. Similar improvements to the actual flume line its self were also made over the next decade, with the wooden fluming being replaced with steel fluming.

1915 – Aqueducts were erected at three separate locations, with those locations being Echo, Grevillea and Sable Creeks. The original aqueduct at Bovine Creek, which measured a substantial distance of 141 metres long with a height of 8.2 metres, was replaced with a more modern syphon. Renewing of syphons at Barney's Creek, Castle and Long Gullies also occurred.

1927 – Work began on replacing the existing pipeline with a more modern ductile iron pipe. This was seen as necessary due to leakages and damage to the existing pipeline. Replacement of the pipeline occurred over much of the next ten years.

1940 – A new 40 mega litre reservoir, named the Kobram Storage, was constructed at Big Hill. This reservoir joined the existing service reservoir at Big Hill.

1955 – Inspection of the flume and aqueduct supports led to them being labelled as being in a "precarious condition". Subsequently, it was recommended that the whole length of the flume line be replaced with 375mm diameter asbestos cement piping at an estimated cost of 70,000 pounds.

1965 – A pump station was constructed at the northern end of Lake Fyans, having the purpose of supplying water to the system during periods of low flow in Fyans Creek. Initially, this housed one pump; however a second pump was installed in 1983.

1978 – As Stawell expanded so did the demand for water, and as a result, an additional 110 mega litre Centenary Storage was constructed at Big Hill. In order to ensure the quality of the water was maintained, a chlorination plant was also added at Big Hill.

1979 – Detailed inspection of the structural integrity of the tunnel was conducted 100 years after the tunnel was completed. It was found that the tunnel was still in exceptional condition for its age, with there being only a few small areas of concern. Consulting engineers from the firm of Gutteridge, Haskins and Davey reported "that the tunnel has weathered 100 years extremely well, and the only point of concern is the short length of timbering near the western portal". The area of concern was noted as being a section of unstable rock, 15 metres from the western entrance. Given this section had been shored up by the original builders of the tunnel it was deemed that no additional construction would be required.

1984 – The 335 megalitre Moray Storage at Big Hill was added as the final storage deemed necessary. The need for this storage was decided as a result of increasing demand for water at Stawell. The Moray Storage was highlighted as being the largest constructed storage in the system.

1988 – A rock fall occurred near the western portal of the tunnel. To rectify the problem, the Western Mining Corporation was commissioned. Rubble was removed and the fractured rock was re-shored. A 20 metre length of 450mm iron pipe was also installed.

1995 – Upon formation of the Grampians Region Water Authority, management of the Stawell Water Supply was assigned to this new body from the Stawell Water Board, as operated under the auspices of the Town of Stawell.

Refer to Appendix 4, for full history of utilities that supplied water to the township of Stawell since inception of the project in 1858.

Summary of Major Changes in the System since it was first commissioned

- Replacement of the original 12" dia. cast iron pipe from the Stawell end of the tunnel to the service reservoir in Stawell with a ductile iron pipe. This pipe is entirely buried throughout its length and virtually none of it is visible. However even if it was visible the outside appearance of a cast iron pipe and a ductile iron pipe are very similar.
- Replacement of the steel flume system by concrete pipe. This pipe is also fully buried and runs near the road between the diversion weir and the tunnel entrance. There is no sign of the pipe track as the bush has pretty much overgrown it. The entry of this new pipe into the tunnel together with some other additions at the tunnel inlet is shown at Fig 3.3.
- Replacement of the open service reservoir at Big Hill by a steel tank within the old reservoir. The steel tank is shown in Figures A2.6, A2.7, and A2.11.
- Replacement of the diversion weir with a slightly higher structure in the same location. The new weir is shown in Fig 3.2. Note that the old weir is still in place and can be seen slightly upstream from the new structure. The old weir is shown in Fig A2.2.

Note that the tunnel is essentially unchanged in structure and use.

The replacement of the flume with a pipe is a major change. The other changes are more of the nature of "maintaining the asset" and represent very little change in the function of the system.

3.3 Historical Notes:

Coinciding with the Gold Rush of 1857 and 1858, was the urgent need for a reliable water supply. Despite a chain of waterholes called "The Chinaman's", located near Doctor's Hill, adequate water supply for prospecting purposes was becoming scarcer and scarcer. In previous years, these waterholes had been fed by nearby springs. However, as more and more miners flocked to the area, these springs ran increasingly bare. In response to this, miners were forced to source water from a greater distance, being old Pleasant Creek. This posed a problem for many miners, as water from this creek had to be purchased at a great cost. Furthermore, many miners were forced to carry water from its source to their place of work, over distances at times greater than 4 miles. This water was also of very poor quality, as cattle and horses readily polluted what little water was available.[7]

In response to this growing problem, the first notion of a water supply was brought before parliament in 1860. The notion was well met, with many other mining districts in the area also requiring the need for immediate aid in the form of a reliable water supply system. In response, funding was provided for the construction of several large reservoirs to be spread out among the six mining districts of the colony. After much campaigning to get as much a share of the funding as possible, the Pleasant Creek Division was able to come away with a sizeable portion of the funding. As a result of this, two sites were determined for the construction of reservoirs, with those sites being the

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[7] Ord, Maynard, 1896, *Stawell Past & Present*

site of the present No. 1 Reservoir at Big Hill and the other being at Commercial Street in the Stawell District [8].

The mining surveyor of the district at the time, Mr. J. Usher, was entrusted with the supervision of the works. Tenders were granted for both dams, with a Mr T. R. Hodges gaining the contract for the No. 1 reservoir and a Mr. Cameron being successful in competition for the Commercial Street contract. Mr Cameron was an experienced contractor and made a sizeable profit on his contract. However, Mr T. R. Hodges gained his tender at an incredibly low price, which in the end ruined him and crippled the finances of many friends who came forward to help him.

The No. 1 Reservoir was fraught with problems both pre and post construction. The site chosen for the reservoir was of an elevated position, where it was conceivable that a reliable water supply would be able to be provided to the town under gravitational principles. The reservoir would have satisfied this goal, had it not been for impurities in the form of mine water and drainage from nearby buildings seeping into the reservoir. Inability to provide any water treatment to the reservoir rendered the water supply almost useless, and approximately a year or two after construction of the No. 1 Reservoir, provisions for improvement for the system were approved. This involved a standpipe to be constructed at the intersection of Sloane Street and Patrick Street, where water would flow under gravity from the No. 1 Reservoir at which point water-carts could be easily filled from the standpipe. The system ultimately failed due to the use of bituminised paper pipes, which were condemned by all respectable engineers as being utterly useless. Despite this, these pipes were laid between the reservoir and the standpipe at a great cost, however collapsed due to their known inadequacy.

Ultimately, the failure of the above system accelerated the proposal for the Grampians Scheme that is in place today. When considered among other alternatives, such as sourcing water from the Black Range basin and from Fyans Creek nearer to the town of Halls Gap, the Grampians Scheme was considered to be the most desirable on the basis of cost and the ability to ensure a consistent supply of quality water. The proposal and construction was managed from start to finish by Borough Engineer Mr. John D'Alton, whose name is well known to Stawell residents to this very day.

Upon approval of the scheme by Mr G. Gordon, the Government's Chief Engineer for Water Supply at the time, work commenced on excavation of the tunnel under Mt William Range. February 18th, the day in which work officially began, was declared a public holiday in the township of Stawell. The tunnel proposed by John D'Alton had a total length of one km, making it the longest tunnel excavation of its kind in Victoria [9]. In regards to excavation, digging of the tunnel was initially extremely difficult, with one worker reporting the rock as "being as hard as any he had ever encountered" [10].

Work initially proceeded using hand drilling however the hard and intractable nature of the rock became more of an impediment as the tunnel bored deeper into the mountain. Two key measures were employed to speed up the work.

Because of the hardness of the rock, explosives were used extensively, with dynamite [11] being the explosive of choice. Dynamite was favoured over traditionally used black powder was a "stronger"

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[8] Refer to locations at Figure A1.3 in Appendix 1 for key locations. It is thought that the Commercial Street location might be in the vicinity of the present Commercial Road, west of the Western highway in the Pleasant Creek area.

[9] Vines, G. 2004. *Stawell Water Supply Scheme, Grampians National Park, Heritage Action Plan*.Biosis Research Pty Ltd.

[10] Kingston, R. 1989. *Good country for a grant*. [Stawell, Vic.]: Shire of Stawell, Victoria.

[11] Dynamite, Wikipedia, version 9 April 2014.

explosive and was safer to work with. This project was one of the first uses of dynamite in Australia.[11]

Secondly rock drilling machines were introduced, considerably speeding up the rate of progress.

John D'Alton introduced rock-boring machinery which consisted of a portable steam engine driving an air compressor supplying air to three rock drills. There were supplied by Robert Gray Ford [12]. D'Alton wrote a letter to Ford in October 1879 commending him on the performance of the equipment (refer to Appendix 5). Ford was a prolific inventor who saw the need for mechanised rock-drilling and invented drills, air compressors and other ancillary machinery suitable for using in mines and tunnelling. It is apparent that Ford's work in Victoria on rock drilling was more advanced than overseas technology. It is probably that his designs were copied by overseas manufacturers and the resulting products sold back into Australia.

At that time a leading group of manufacturers of such equipment were the Ingersoll Rock Drill Company (formed in 1871 with the inventor involved being Simon Ingersoll) and the Rand Drill Company (formed in 1879) in the United States of America [13]. These two companies competed with one another in some product lines. Both companies had active sales representatives in Australia. Ingersoll and Rand amalgamated in 1905 to become Ingersoll Rand Company which remains a major global player in the air compressor and rock drilling markets amongst other interests [15].

Although the tunnel proved to be a difficult excavation, utilizing the relatively untried dynamite and new technology rock drills for tunnelling achieved the desired outcome. Furthermore an impeccable safety record was maintained, with no casualties or major injuries occurring.

In March of 1880, tunnelling had progressed to a point at which explosions could be heard from either side of the construction, as the two sides of the tunnel were close to meeting. On March 2nd, an eleven foot length of drill was used to break through from one of the sides of the tunnel. The drill extended some four feet before breaking through.

Simultaneously, as tunnelling progressed, laying of pipeline from the tunnel to Stawell began. Given the relative flatness of the land to the east of the tunnel towards Stawell, when compared to the mountainous terrain to the west, laying of the pipe advanced quite quickly. Within four months the pipeline was complete, allowing for excavation to begin on the service reservoir at Big Hill.

Upon completion of the piping between the tunnel and Stawell, focus turned to the system that would carry water from Fyans Creek to the tunnel entrance. Given the undulating terrain, and the need to follow the contours of the land in order to maintain a gravity system, wooden fluming was used throughout from Fyans Creek to the tunnel entrance, with high wooden trestles being constructed in order to cross several creeks. A lack of foresight must be noted in regards to the chosen construction material, given the high likelihood of bushfires occurring in the densely forested area. As a result, the wooden fluming was later replaced with much more durable steel fluming and stone pillars were used instead of the original wooden trestles.

By July of 1881, the flume line and tunnel had been completed, bringing to an end the six year construction period. The project was finished at a cost of 115,000 pounds, with the Government accounting for a substantial portion of the project cost. A full breakdown of the cost involved with the

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[11] Parks Victoria. 2007. *GRAMPIANS NATIONAL PARK (GARIWERD) – ITS CULTURAL HERITAGE.*[online]Available at: http://parkweb.vic.gov.au/__data/assets/pdf_file/0003/315516/Heritage-story-Grampians-National-Park.pdf [Accessed: 24 Feb 2014].

[12] Refer to paper by James A Lerk on Robert Gray Ford at Appendix 6.

[13] The Development of Ingersoll and Rand, and Ingersoll Rand in Australia, James H Whitehead, date and published not known.

[15] Ingersoll Rand company web site: http://company.ingersollrand.com. Note that the company is incorporated in Ireland as Ingersoll Rand PLC.

project can be found in Appendix 3. As the years progressed, maintenance of the flume line was considered a full time job, with responsibility falling upon appointed caretaker Norman McDonald. Mr McDonald held the position of caretaker until 1896, and in doing so, ensured that the flume line was free of debris and that water flowed at a sufficient quality.

A substantial construction in the Stawell Water Supply system was the aqueduct at Bovine Creek [14]. Measuring an impressive 141 metres long and 8.2 metres high, the aqueduct at Bovine Creek dwarfed similar constructions at Echo, Grevillea and Sable Creeks [15]. However, as this aqueduct was constructed from wood, the decision was made to replace it with an iron (or steel?) syphon. This made for a much more fire resistant construction whilst still maintaining the water head required to transport water under gravity from Fyans Creek to the township of Stawell.

Figure 3.1: Original timber aqueduct carried water across valleys within timber flumes

Source: Unknown

As the years progressed and construction methods and machinery improved, the decision was made to replace the flume line with underground piping in 1955. At this point, the flume and supports were said to be in a "precarious condition", with replacement deemed necessary and coming at a cost of 70,000 pounds.

As the town of Stawell expanded, so too did the demand for water. The 110 megalitre Centenary Storage and the 335 megalitre Moray Storage were constructed on Big Hill. Included as part of this construction was the chlorination plant at Big Hill, which was deemed necessary in order to disinfect water sourced from Fyans Weir and Lake Fyans.

[14] Bovine Creek is shown on Figure A1.2 in Appendix 1.

[15] The crossing at Grevillea Creek is shown in Figure A1.2 in Appendix 1. Sable and Echo Creeks have not been located on mapping now available although several unnamed creeks cross the line of the Flume. It is also noted that the historical text does not mention Deep Creek although this appears from maps to be a substantial crossing.

Figure 3.2: Current weir, old weir was located a few metres upstream
Source: Flickr rf_toaster, Stawell Water Supply 2014

As these storages were being constructed, a detailed inspection of the tunnel was carried out. The consulting engineer hired to perform the inspection reported "that the tunnel had weathered 100 years extremely well, and the only point of concern is the short length of timbering near the western portal" [16]. The positivity of this inspection is a testament to the engineers and builders who tirelessly worked on the excavation. Despite one minor rock fall in the years following the inspection, the tunnel remains in almost identical condition to the tunnel completed over 100 years ago.

[16] M, P. 1979. Yearly Inspection for Water Tunnel. *Stawell Times*, 29th of June.

Figure 3.3: West entrance of tunnel

Source: Owen Peake 2013

Figure 3.4: Eastern end of water tunnel

Source: Flickr rf_toaster, Stawell Water Supply 2014

3.4 Heritage Listings

Heritage Victoria

Name: Stawell Water Supply Scheme

Number: Heritage Inventory (HI) Number H7423-0079

Note that this listing indicates that the site is not registered.

4.0 Assessment of Significance

4.1 Historical significance:

After the Gold Rush and the creation of a town at Pleasant Creek a high priority was the creation of a permanent water supply. The system designed by John D'Alton in 1875 proved to be sustainable and has had a long life, aided by many upgrades. Fyans Creek, on which this scheme was based, rises in the Grampians mountains and provides a reliable source. The D'Alton system was a gravity system without pumping which was a great operational advantage.

The water system implemented an open flume line leading from Fyans Creek, through the mountains and into a kilometre-long tunnel. The water flowed along the floor of the tunnel and into a pipeline from the tunnel exit, which carried the water to Stawell.

Elements of the water supply system are still in use 132 years after it was first completed.

4.2 Historic Individuals or Association:

John D'Alton (1829-1904) – Appointed Stawell Borough Engineer in 1869, John D'Alton was directly responsible for the Grampians fed system that exists today. D'Alton's scheme was one of five schemes suggested for supplying water to the Stawell District, eventually approved for construction at a cost of 84,000 pounds.[17]

John D'Alton was born in Tipperary, Ireland 1829. He met his first wife, Jane Galbraith, born in Scotland in 1834, while living in Ireland and started their own family. John and his family migrated to Melbourne in 1861, aboard the *SS Shallimar,* from Ireland where their father had managed an estate for Lord Ormond. Their ship arrived at Port Melbourne in 1861.[18] Before moving to Stawell, D'Alton was a surveyor at Ararat. At first he was an engineer for the Stawell Shire, then for the Borough for whom he designed the Stawell Town Hall and the unique water supply system.

After the death of D'Alton's first wife, Jane, in 1874, the rest of his family decided to join him in the colonies, including his widowed mother, her 3 daughters and 2 sons and their family governess. Many members of the family worked on land near Mt. Arapiles for several years before all moving to the Fyans Creek Valley.

After choosing their land in 1878, their move sparked controversy, as their new blocks were previously proclaimed as part of a forest reserve, before suddenly and quietly being declared open for selection. The D'Alton's continued to live in the Grampians throughout their whole lives [19].

John D'Alton died in in 1904 in Brighton. His body was returned to Stawell for burial due to his close ties to the town. A memorial fountain was built in town, in order to commemorate D'Alton's achievements for the town of Stawell.

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[17] Russell, G. 2009. *125th Anniversary Celebration Stawell Water Supply Commencement of Works, 18th February, 1875*. North Melbourne: Australian Scholarly

[18] D'Alton, K. J. 2000. *Pandora Archive First Families 2001*. [online] Available at: http://pandora.nla.gov.au/pan/10421/20041220-0000/www.firstfamilies2001.net.au/firstfamily2467.html

[19] Murray, R. and White, K. 1983. *The Golden Years of Stawell.* Town of Stawell: The Dominion Press-Hodges & Bell, Maryborough, Victoria.

Figure 4.1: John D'Alton

Source: Kingston 1989

George Gordon (1829-1907) – Chief Water Supply Engineer for the Victorian Government; Gordon's visit to Stawell in 1874 resulted in the approval of John D'Alton's Grampians Scheme.

George Gordon was a civil engineer, working largely in Melbourne in the late 19th century. Born in 1829 in Scotland, Gordon moved to Victoria, Australia after he obtained the position of Chief Engineer for Water Supply in Victoria.

Before studying engineering at University College in London, Gordon attended a local Academy in his home town and later studied at Bonn and Wiesbaden in Germany. Once he was qualified, he began working on Parliamentary surveys and assisting a consulting engineer.

In 1851 Gordon moved to Holland and in 1859 to India where he worked as in engineer in waterworks companies before obtaining a position as Chief Engineer in Victoria in 1871.

Gordon continued working in Australia with short visits to London and New Zealand up until his retirement in 1889. He worked in Melbourne as chief engineer of the Board of Lands and Works and then transferred to the Water Supply Department where he was chief engineer until Black Wednesday 1879, where dozens of public servants were sacked in a government financial crisis. The case was dismissed and Gordon wrote to the Victorian governor and the Queen, however he was never reinstated.

Gordon then went on to run his own engineering firm where he carried out numerous private projects in town water schemes through to his retirement in 1889. He also published papers on 'The Value of Water and its Storage and Distribution in Southern India' and on 'Irrigation in Victoria'. Some of his papers and publications are now located in the State Library of Victoria [20].

Norman (1842 – 1903) and Margaret (1846 – 1935) McDonald - The McDonald family came to Halls Gap to work on construction of the flume line. At the completion of the flume line in 1882, Norman was named as caretaker. The McDonalds had 15 children in total, with 10 being born during their time at Halls Gap. They were assigned to live in a small timber cottage that was provided to the appointed caretaker, located at the Borough Huts. The job of flume caretaker was difficult, with Norman required to work long hours walking the flume line, ensuring it was clear of debris and that sufficient water supply was flowing along it [21].

Robert Gray Ford (circa 1833 – 1891)

Refer to Appendix 6

4.3 Creative or Technical Achievement:

An important country water supply for an area originally settled for gold mining. The search for a non-pumping scheme was far-sighted and audacious considering that it involved the construction of a one kilometre tunnel under a mountain range. Furthermore, the tunnel is still in service today as an integral part of the current Stawell Water Supply system more than 130 years after its initial construction. This reflects well on the technical achievements of the surveyors, engineers and builders of the Stawell Water Supply.

It must also be noted that the construction of the tunnel through Mt William Range signified one of the first projects where dynamite was used in preference to black powder in Victoria and an early use of the technologically advanced Robert Gray Ford rock drilling equipment.

The unpredictability of black powder brought about this change in construction methods, as black powder was known to ignite unexpectedly, and ignition times were erratic under varying degrees of humidity. Furthermore, use of black powder required deep holes to be drilled into the rock face to ensure adequate clearance of rock. In contrast, the use of dynamite allowed for shallower holes to be drilled, whilst still providing a much greater destructive yield. Consequently, the use of dynamite allowed for a less labour intensive tunnelling process, over a shorter period of time.[22] In addition, it

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[20] Garden, D. S. 1972. *George Gordon 1829 - 1907.* [online] Available at: http://adb.anu.edu.au/biography/gordon-george3637/text5657

[21] Ida, S. 2000. Caretakers of the Water Supply. *Stawell Times - News*, Friday 25th of February, p. 16

[22] Railroad.lindahall.org. n.d. *Black Powder and Nitroglycerin - The Transcontinental Railroad.* [online] Available at: http://railroad.lindahall.org/essays/black-powder.html [Accessed: 24 Feb 2014].

may be that the use of dynamite over black powder contributed to the exceptional safety record achieved by those working on the project, as work was completed without the occurrence of any major injuries or fatalities.

New technology was also employed in the tunnelling operation in the form of a rock boring rig supplied by Robert Gray Ford. This technology was ahead of its time and superior to imported rock boring machinery. This innovation considerably sped up the construction of the tunnel which encountered very difficult rock formations.

The construction of a flume line over extremely rough and undulating terrain represents a significant achievement in the area of design, surveying and construction. As the flume line route was over solid sandstone outcrops, trenching for a buried pipeline through this terrain was not considered a viable option at that time.

The whole scheme allowed water to flow from Fyans Weir completely under gravity at a level so as to provide an adequate head of water to reach the town of Stawell.

4.4 Research Potential:

The main avenue for further research in regards to the Stawell Water Supply exists in establishing to what extent the flume line survives today and what condition it is in. As a result of a site visit, it can be seen from figure A2.18 that parts of the flume line still exist today and are in relatively good condition. Nevertheless, given that the flume line extends for some 12 kilometres, detailed inspection of the flume line in its entirety was not possible. However, a map shown in figure A1.2 has been used to highlight the flume route.

4.5 Social:

Provision of safer and reliable water supplies was known at this time to have major health benefits. Before clean water supplies typhoid was a major killer in the drier climate goldfields, like Stawell. The provision of safe water supplies, even today, is problematic in many parts of the world although we take such systems for granted in Australia. Back in the 1850s the social impact of a formal water supply system was less well understood and local authorities had to fight hard to obtain funding and approval for such systems. However, once the gold rush hit its peak in 1858, the pressure for a reliable water supply became hard to ignore. Consequently, after failed constructions and inferior proposals, John D'Alton's Grampians Scheme was settled upon in 1874. Construction of this system allowed for the continued expansion of Stawell and surrounding townships and has allowed the Grampians area to flourish into the tourist mecca that it is recognized as today.

4.6 Rarity:

Some elements of this public water supply system can be considered rare.

No other systems have been found in Victoria during research which incorporate fluming, tunnelling and pipelines in order to convey water from one point to another under gravity [23]. Note that fluming had been used extensively for channelling water, particularly in relation to hydraulic mining and logging industries [24].

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[23] Blainey, G. 2013. *A History of Victoria*. 2nd ed. New York: Cambridge University Press.

[24] Koester, Frank (1909). *Hydroelectric Developments and Engineering.* New York: D. Van Nonstrand. p. 40–45.

4.7 Representativeness:

Other than the tunnel and the fluming the characteristics of the scheme were typical of country water supply systems in Victoria at the time.

4.8 Integrity/Intactness:

Elements of the water supply system are still being used for the town's water supply. These include the tunnel and some elements of the weir and the concept of a pipeline from the tunnel to the town service reservoirs. The old flume has now been replaced by a concrete pipeline.

The old steel flume is still partially intact but has is very dilapidated. At least one siphon is still intact with minimal damage.

The tunnel has had minimal repairs at the western end due to a cave in but is still being used as first designed in the 1870s.

The pipeline from the tunnel to the town has been replaced but retains its original route and function.

5.0 Statement of Significance:

The Stawell Water Supply System, constructed between 1875 and 1881, is significant for its historical and social values. During the 19^{th} century, the Stawell water supply system was seen as the most elaborate country water supply works in Victoria, incorporating fluming, piping and tunnelling in order to transport water under gravity from Fyans Creek to the township of Stawell. The system, designed by John D'Alton, was constructed predominantly by hand, as very little machinery was available for use at the time, representing a significant engineering achievement.

Notable components of the system include the tunnel under Mt William Range, recognized as being the most difficult tunnel construction of its kind in Australia at the time. The hardness of the rock contributed to the difficulties associated with construction. As a pioneering achievement, the tunnel signifies the first recorded instance of dynamite being used in preference to black powder for tunnelling in Victoria. The use of dynamite may have contributed to the impeccable safety record on the tunnel project, with no deaths or serious injuries occurring during construction.

New technology was also employed in the tunnelling operation in the form of a rock boring rig supplied by Robert Gray Ford. This technology was ahead of its time and superior to imported rock boring machinery. This innovation considerably speeded up the construction of the tunnel which encountered very difficult rock formations.

Furthermore, the flume line is also significant as it denotes a tremendous feat of engineering and construction in particularly rough country. The flume line was expertly constructed along the natural contours of the land. A difficult balance was achieved in doing this, as water had to flow under gravity at a sufficient head so as to provide adequate flow to the township of Stawell, whilst ensuring that overtopping of the flume line wall did not occur.

The gold rush in Stawell and the surrounding areas necessitated a reliable water supply, in order to satisfy the demand for clean water for mining and general living needs. The effectiveness of the system allowed for the rapid settlement and development of the Stawell district and ensured a greater quality of life for those who decided to reside in Stawell. Without the establishment of the Stawell water supply system, it is possible that the Stawell district would not have boomed into the tourist area it is viewed as today.

6.0 Area of Significance:

This project should be recognised as being of state significance.

This is due to the fact that the Stawell Water Supply system was the only country water supply system to incorporate fluming, a water tunnel and pipeline in the one system in Victoria. In addition, the tunnelling for the Stawell Water Supply system was constructed using advanced techniques; the first recorded case of the use of dynamite in tunnelling in Victoria and a very early use of the Robert Gray Ford rock drilling equipment. These innovations add to the significance of the project.

7.0 Interpretation Plan:

7.1 General Approach:

The strategy for interpretation of the Engineering Heritage Works is laid out in the latest version of EHA's "Guide to the Engineering Heritage Recognition Program" [25]. The interpretation will be by marking the works with an appropriate level of heritage marker; a public ceremony to unveil that marker and an interpretation panel which summarises the heritage and significant features of the works for the public.

This plan provides a summary of the proposals for design, content, location, manufacture and funding of the proposed interpretation.

The ceremony is currently planned to as part of a two-day event, centred around celebration of the engineering heritage significance of the Stawell Water Supply with the actual ceremonies held on **Sunday 12 October 2014.** The Horsham Regional Group is suggesting that ceremonies could be held in the vicinity of the two interpretation panels proposed.

7.2 General Attributes of the Interpretation Panels:

1) A title "Stawell Water Supply"
2) A sub title: **To be reviewed**
3) Logos of Engineers Australia, GWMWater, Northern Grampians Shire Council, Parks Victoria to be incorporated.
4) A small size representation of the EHA marker plate
5) The date and other details of the marking ceremony.
6) Text should be 24 point Arial Bold
7) Maximum text should be 500 words
8) A map of the Stawell Water Supply System
9) Historic photographs preferably not ones used on the other interpretation panels in the vicinity.

Panel locations:

- At Big Hill in close proximity to the No.1 Reservoir.
- At Borough Huts camp ground.

7.3 The Interpretation Panel:

1) Size to be nominally 600 mm high by 1200 mm wide.
2) The panels to be constructed of vitreous enamel-on-steel plate with flanges as per drawing at Appendix 7
3) The panels to be mounted on steel fabricated frames as per Appendix 7.

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[25] The 2012 version. www.engineersaustralia,org.au search for Engineering Heritage Australia and Heritage Recognition Program.

7.4 Possible Interpretation themes for Interpretation Panel

There will be two standard panels with the following themes:

Both Panels:

- The History of the Stawell Water Supply
- John D'Alton - the engineers for the scheme The panel at Big Hill:
- The need for water in Stawell The panel at Borough Huts:
- The flume line from the Diversion weir to the tunnel entrance
- The tunnel

7.5 Location of Interpretation Panels

After a site visit to Stawell and the water supply system associated sites, a few sites for the interpretation panels were found to be suitable.

A visit to Lake Bellfield gave a great viewing area for the panel, as many tourists and locals visit the lake daily. However this lake is used within the Wimmera Mallee Scheme and is not associated with the Stawell Water Supply.

The second site that was looked at is the western entrance of the tunnel where the old flume used to end and water flowed into the tunnel. This site is not recommended as the track is too difficult to access and is only accessible in a 4WD vehicle. This site is barely visited by tourists or locals and is therefore not suitable for an interpretation panel site.

A site of the diversion weir could also be appropriate for an interpretation panel as the weir was constructed in the original scheme in the 1880s and is currently in use for the Stawell Water Supply. A small dirt road off the main road leads to the car park and weir but the road is not marked and hard to find.

A panel located at the Borough Huts picnic area might offer the best compromise. This site was central to the Stawell Water Supply as it was here that the people who operated it lived and worked. The site is easily and safely accessible and is maintained by Parks Victoria.

The last site that was considered is on Big Hill in Stawell. This site already houses an interpretation panel for Stawell's mining history and is a perfect location for a panel based on the town's water supply, both past and present. The site is easily accessed and visited by many tourists and locals daily.

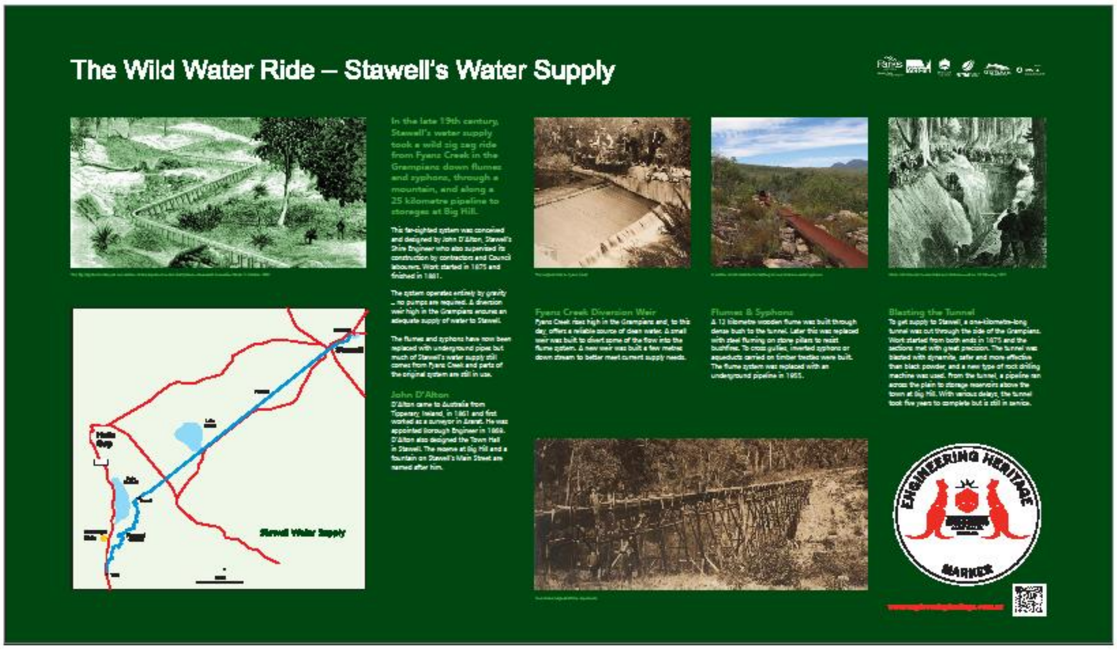
The panel should be located as close as possible to the John D'Alton Water Reserve (No.1 Reservoir) on the way up to the rotunda and car park.

The sites of the interpretation panels have yet to be confirmed but the most preferred and suitable sites would be on Big Hill and Borough Huts.

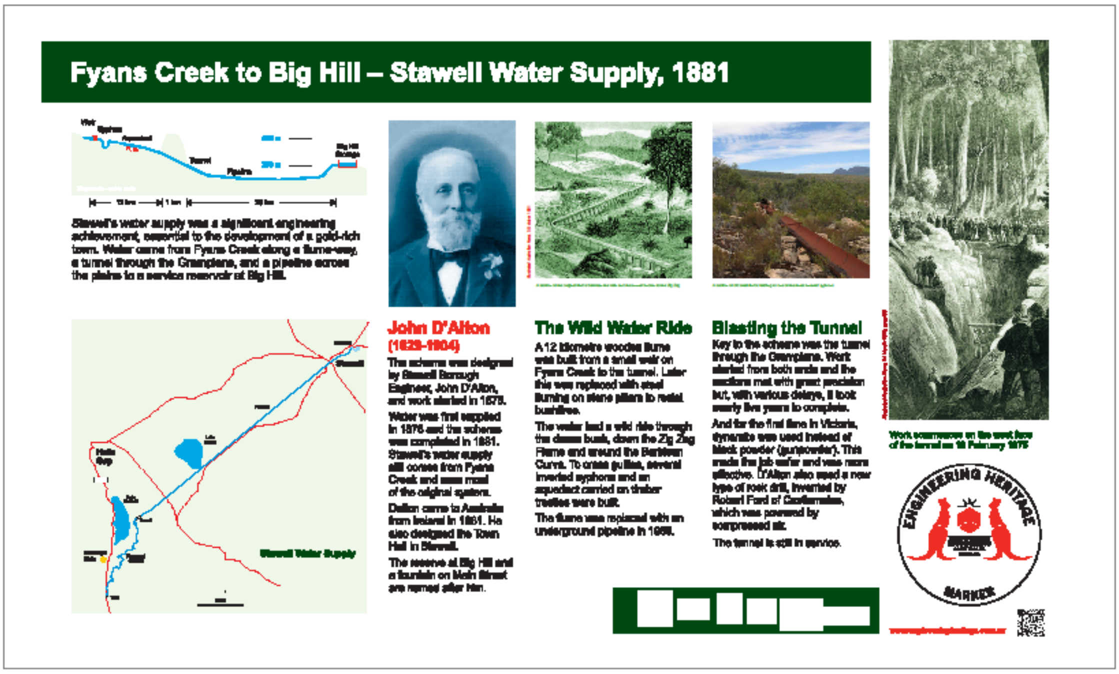
Suggestions have been made that additional small panels or markers referring to the interpretation panels could be located at other sites along the route of the water supply infrastructure. This matter is still under consideration.

7.6 Preliminary Design of Interpretation Panels:

Borough Huts Interpretation Panel



Big Hill Interpretation Panel



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8.4 Images

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APPENDIX 1 Maps

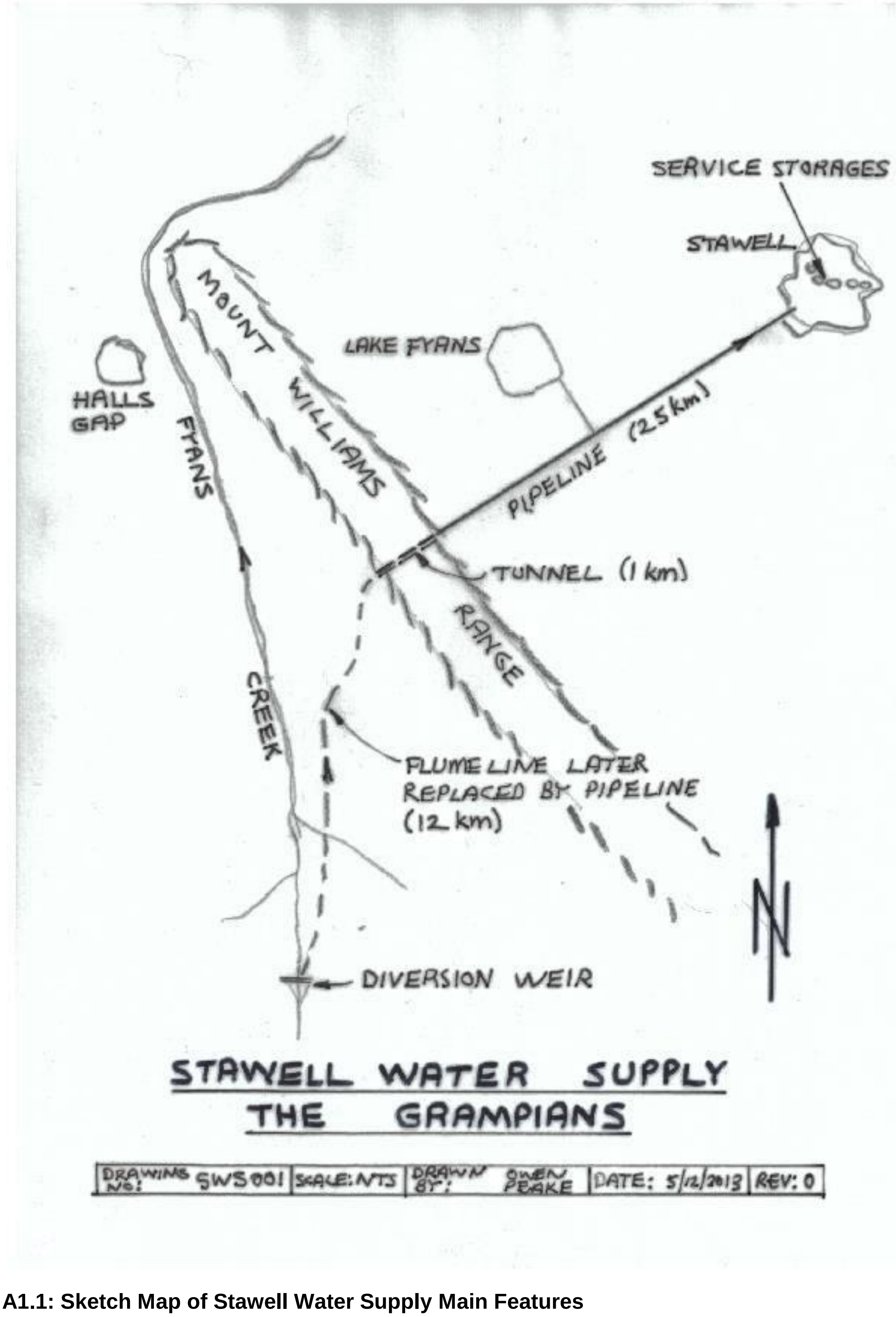

Figure A1.1: Sketch Map of Stawell Water Supply Main Features

Source: Owen Peake December 2013

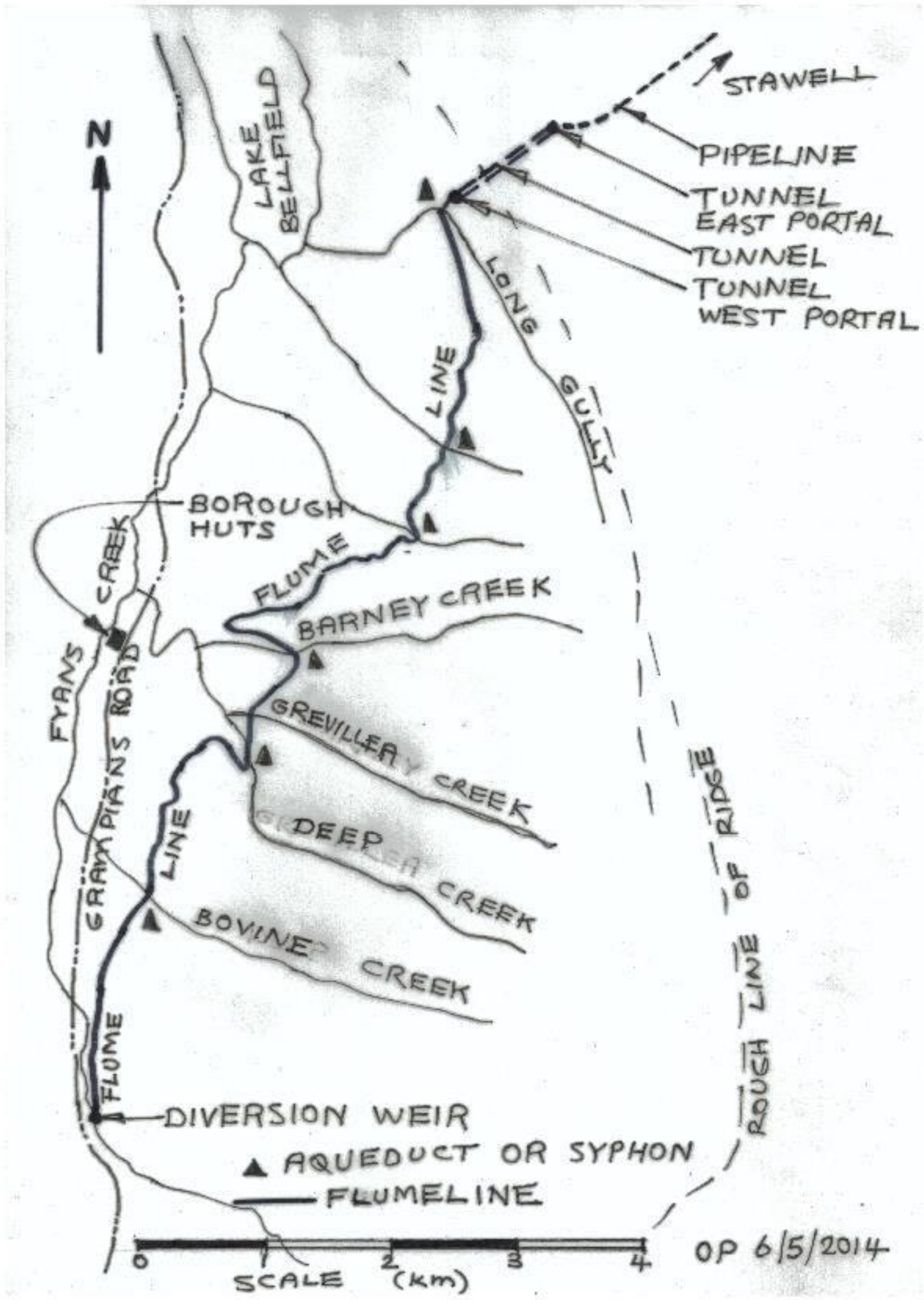

Figure A1.2 The Flume line and major creek crossings within the Grampians

Source: Owen Peake May 2014

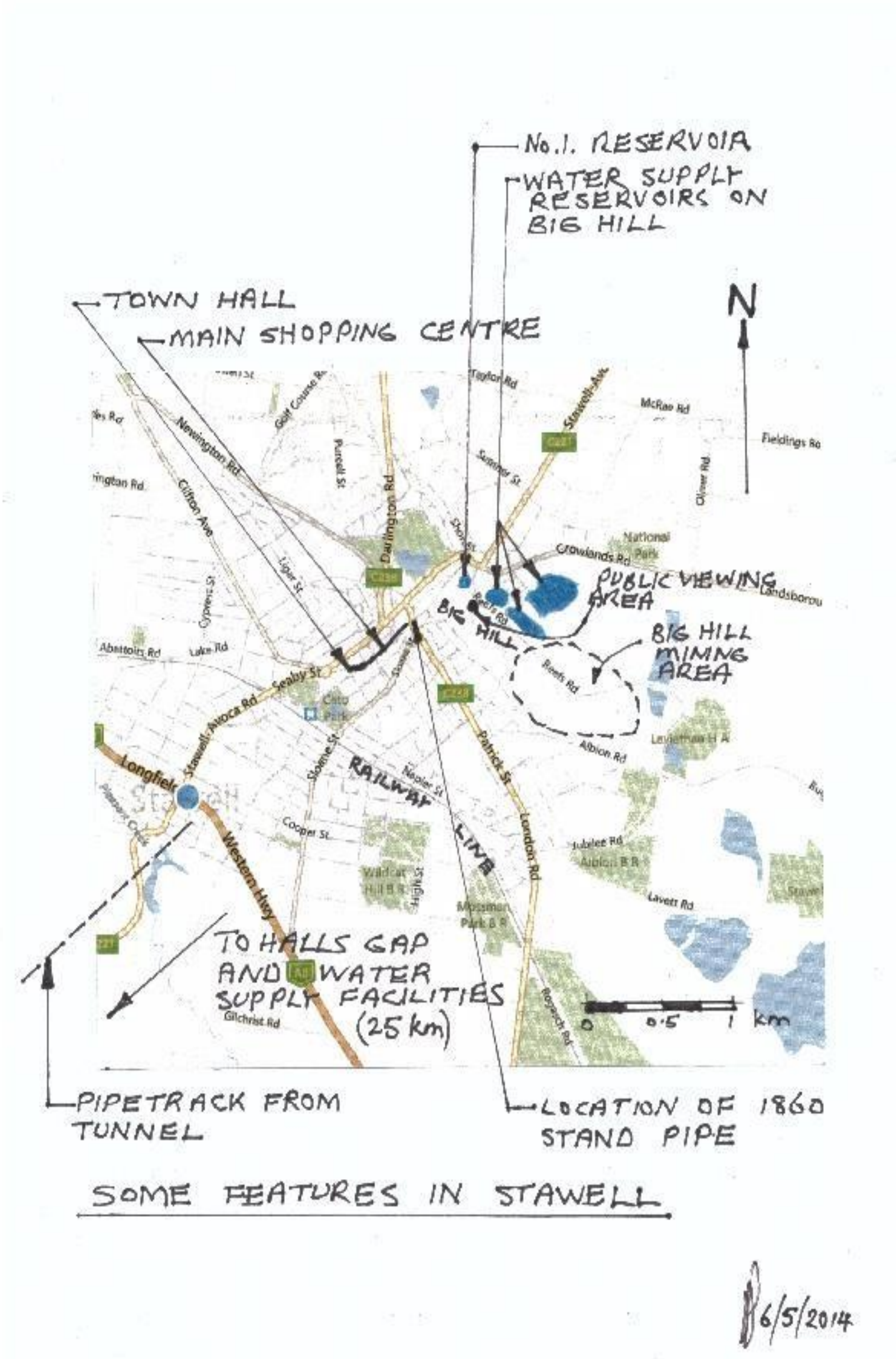

Figure A1.3 Some Features of Water Supply Infrastructure in Stawell.

Source: Owen Peake May 2014

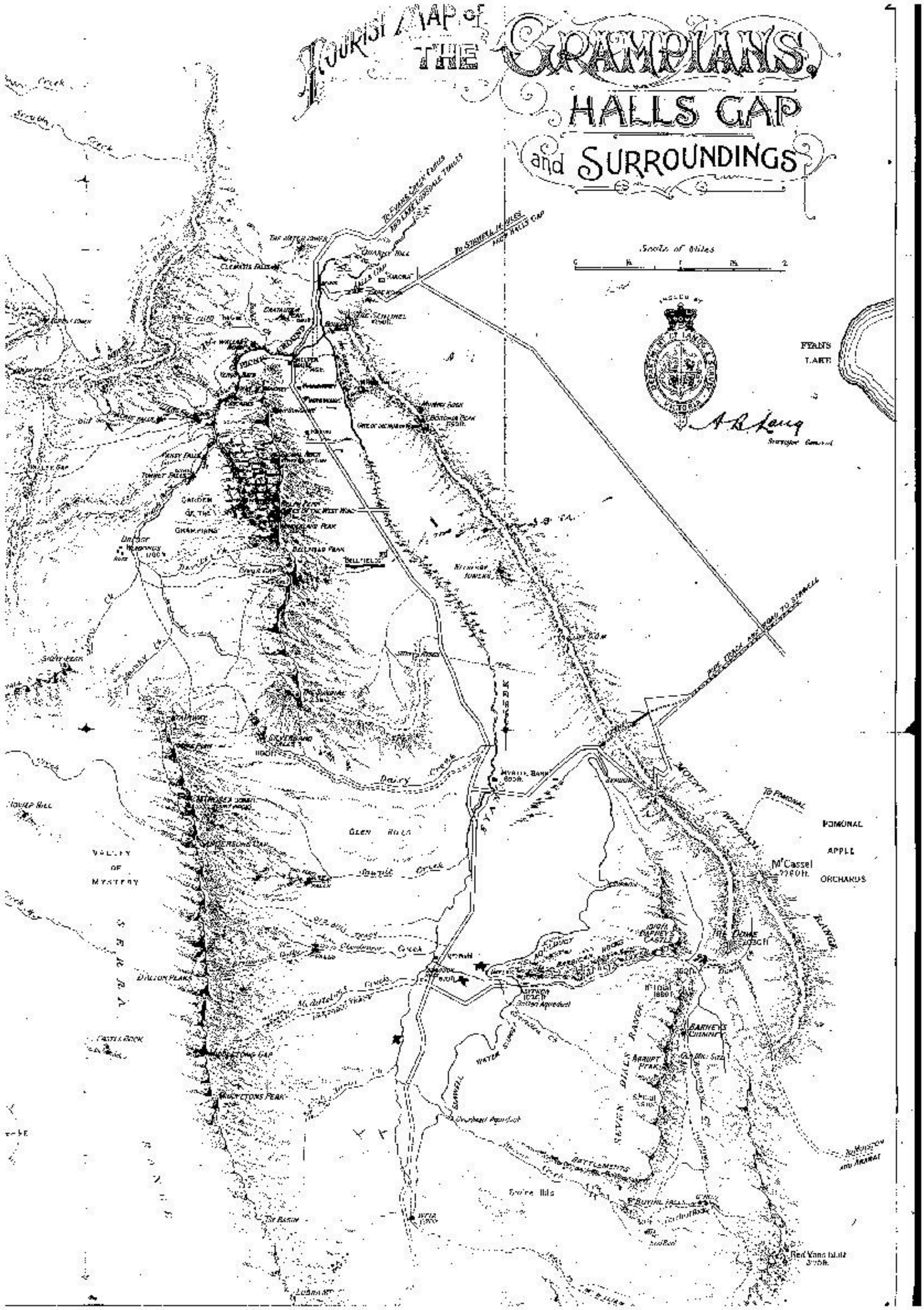

Figure A1.4: Map of Grampians dated 19 September 1911

Source: Department Lands and Survey

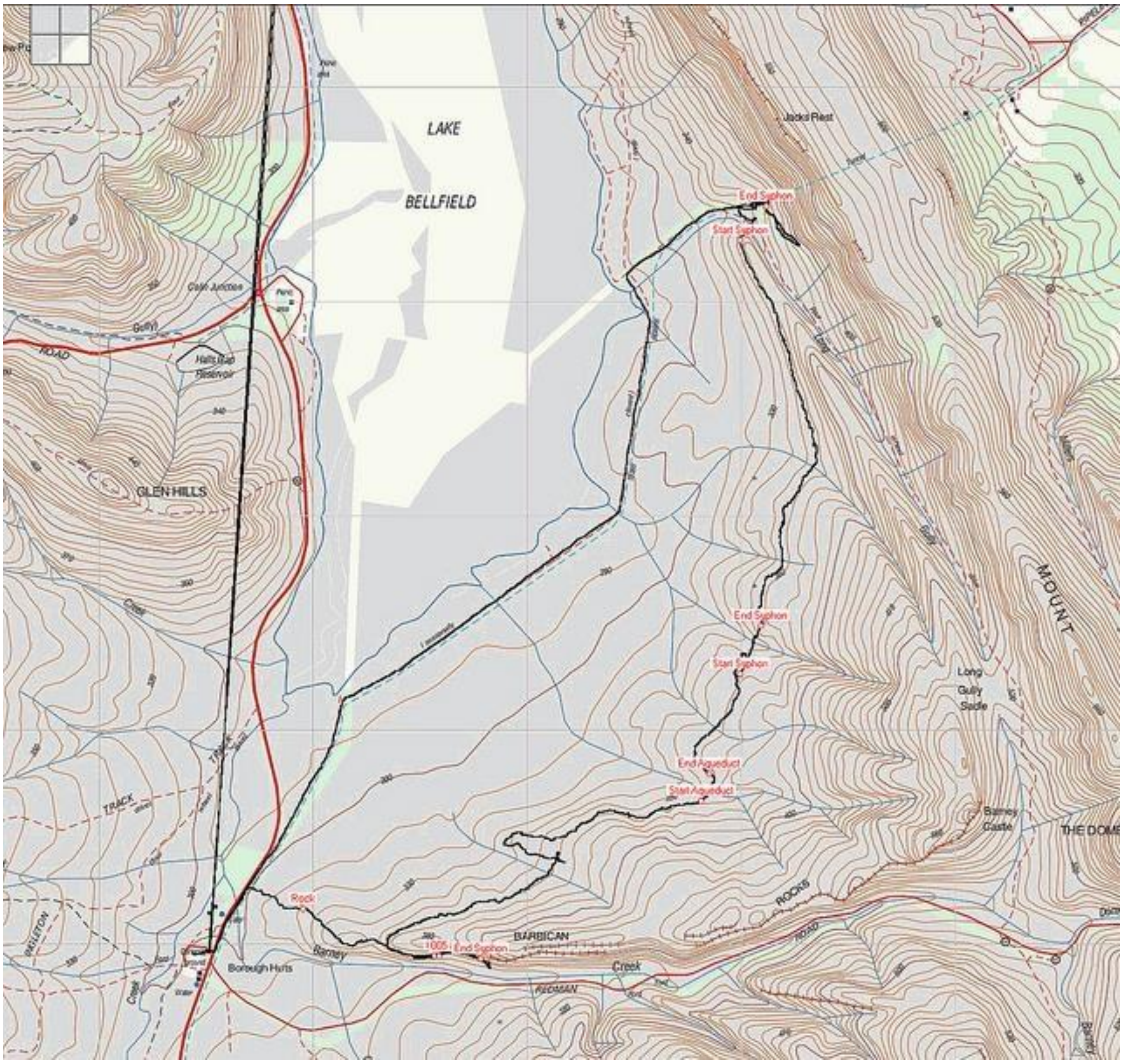

Figure A1.5: Map of old water supply system

Source: Flickr rf_toaster, Stawell Water Supply 2014

Figure A1.6: Water storages at Big Hill. No.1 Reservoir is the round structure at the top right of the image just outside the top blue line.

Source: Google 2014

APPENDIX 2 Images

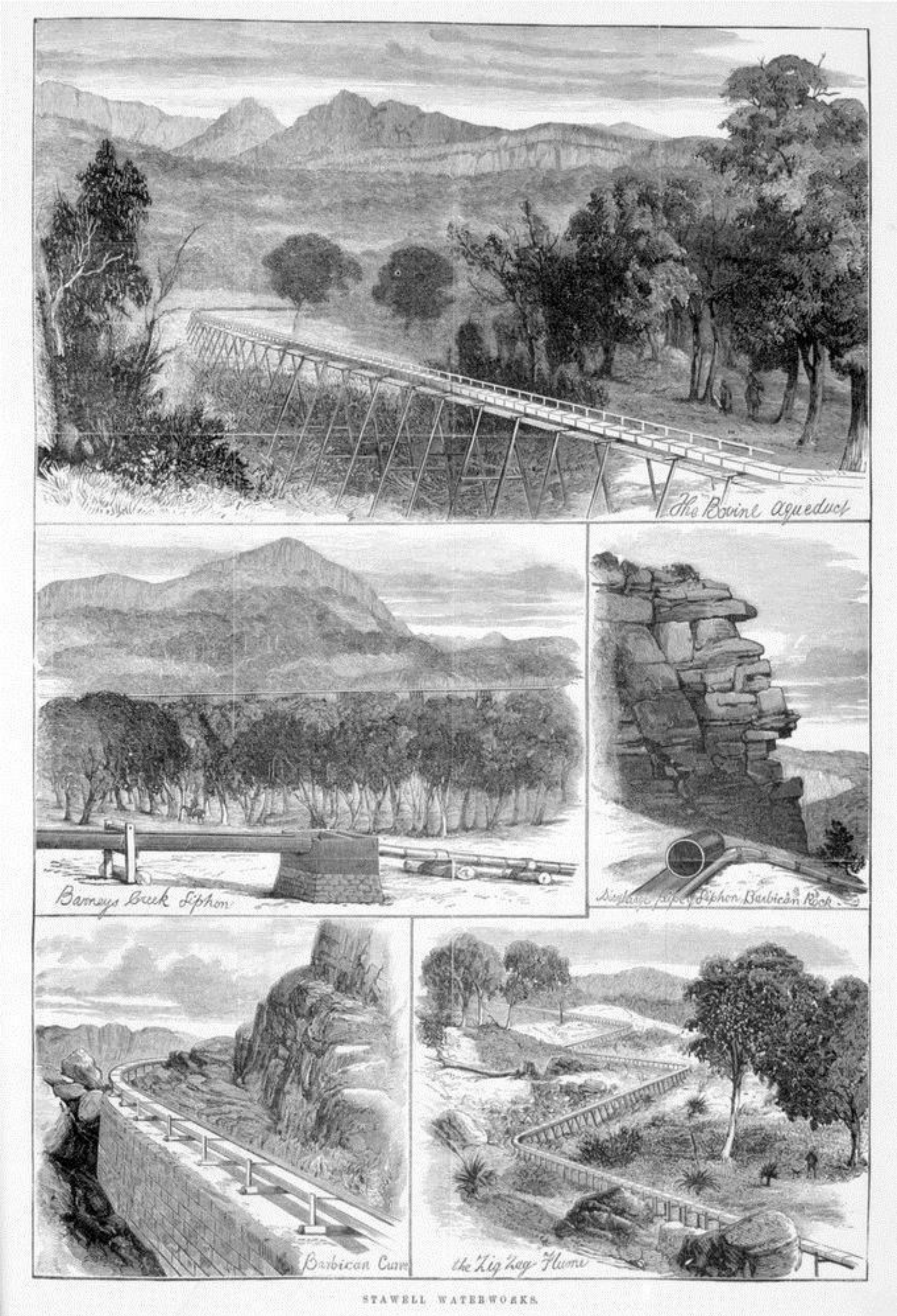

Figure A2.1: Stawell Waterworks poster, 1881.

Source: David Syme and Co, Melbourne.

Figure A2.2: Original diversion weir at Fyans Creek

Source: Public Record Office Victoria

Figure A2.3: Digging of the eastern end of tunnel

Source: Flickr Public Record Office Victoria

Figure A2.4: Inside the Stawell Water Supply tunnel during an officially sanctioned inspection through the tunnel in 1979

Source: Miles Pierce

Figure A2.5: Inside water supply tunnel

Source: Miles Pierce

Figure A2.6: Reserve at Big Hill named after the water supply engineer, John D'Alton

Source: Owen Peake 2013

Figure A2.7: Water storage tank built in the old No.1 reservoir

Source: Owen Peake 2013

Figure A2.8: Water storages at Big Hill
Source: Owen Peake 2013

Figure A2.9: Valve house at No.1 reservoir
Source: Owen Peake 2013

Figure A2.10: Remnants of old piping at Big Hill
Source: Owen Peake 2013

Figure A2.11: Old concrete lined water storage with new storage tank built in
Source: Owen Peake 2013

Figure A2.12: Current weir
Source: Owen Peake 2013

Figure A2.13: Section of fluming with stone pillars

Source: Flickr rf_toaster, Stawell Water Supply 2014

Figure A2.14: Remnants of Long Gully Syphon near western tunnel entrance

Source: Owen Peake 2013

Figure A2.15: Long Gully Syphon, including a diversion valve
Source: Owen Peake 2013

Figure A2.16: Long Gully Syphon pipeline
Source: Owen Peake 2013

Figure A2.17: Long Gully Syphon header box

Source: Owen Peake 2013

Figure A2.18: Flume section near Long Gully Syphon

Source: Owen Peake 2013

APPENDIX 3 Newspaper Articles

THE STAWELL WATER SCHEME [26].

(FROM OUR OWN CORRESPONDENT.)

The Stawell water supply scheme, of which the most important stage — the tunnelling of the Grampian Range — was completed on Saturday, March 20, is one of the most important, and promises to be the most complete system of water supply in any of the country districts of Victoria. Fifteen miles from Stawell, and directly to the west lies the Grampian Range which forms a very absolute line of demarcation in reference both to climate and soil. On the other side from Stawell the climate is colder and the soil begins to show those evidences of fertility which are first observable in the country known us the Victoria Valley. To get an unfailing supply of water, it was found, after a number of flying surveys by experts, that the boldest and most comprehensive scheme would be to bore a tunnel through the heart of the mountain, and thus form a waterway for Fyans Creek, a clear mountain stream that runs six miles away from the foot of the mountain where the western end of the tunnel would be commenced. The whole work was conceived and matured by Mr John D'Alton, the borough engineer, in the face of rival schemes advised by men who were well known as hydraulic engineers. It was not without some difficulty the local borough council could be got as a body to agree to an undertaking of such magnitude, and likely to involve the outlay of a very large sum of money. At that period, however, Stawell was in a flourishing state as compared with what it is today and there was often great delay caused to the proprietors of the mining claims in the inability of the mill owners to procure sufficiency of water to enable them to crush continuously. One of the weightiest considerations in inducing the council to undertake the scheme was that with an abundant supply of water each mining company could, if they saw fit, erect a battery on their own claim and empty the quartz as it reached the surface into the stamper boxes to be reduced. This system would be equal to a consideration of some penny weights to the ton, and enable companies to crush with profit many thousands of tons that could not under other circumstances be utilised. When the work was first commenced it was not thought the expenses would swell to near the large sum they have since attained. The estimate of tunnelling the Grampians, for example, was considerably below the actual cost in consequence of the rock proving to be a quartzose combination with siliceous sandstone, a 'country' which, so far as mining experience goes, is the hardest known. The survey of the scheme was commenced in October, 1873, and occupied about six months, but it was not till the February of 1875 that the first sod of the tunnel was turned by the then Mayor, Mr. H. C. Purcell. This was done with considerable ceremony, those present little dreaming of the vexatious de lays and difficulties which would be presented before the colder air of the western side would sweep the tunnel from end to end. The first contract taken for this part of the work was for 500ft. at 17s. 6d. per foot, but when 100ft. had been put in at the western side the contractors declined to proceed. In April, 1875, a contract for the whole tunnel was let at $2 15s. per foot, but after driving 528 ft. this was also abandoned by the men in consequence of the impracticable nature of the rock, which increased in density and hardness as the centre of the mountain was approached. After this time work was stopped for 20 months because of difficulties having arisen in obtaining funds. Up to this time the driving had been done by hand, and when money was again available Ford's rock boring machine was procured. This was started at the eastern end on the 1st March, 1878, the western end having been carried on by hand labour to meet the borer till the work was completed. The average progress made by the machine was not more than 12ft. per week. In this allowance is to be made for innumerable delays caused by breakages, and the need for other repairs. In the meantime the laying of the 15 miles of mains to join the Grampians and Stawell was going on. This part of the scheme was commenced in 1876, and finished on the 7th of February, 1877, when the laying of the reticulation pipes was at once commenced, and finished in three months over 14 miles of streets. Simultaneously with this work, a service reservoir was constructed on the shoulder of what is known as "the Big Hill." This is the place on and around which all the richest quartz claims of Stawell are grouped. Along its base runs the line of the now celebrated Scotchman's Reef, and in the vicinity are the Pleasant Creek Cross Company's mine, the Extended, the Oriental, the Newington, the Prince Patrick, the Magdala, and many others not so well known to the outside public. The service reservoir is built to

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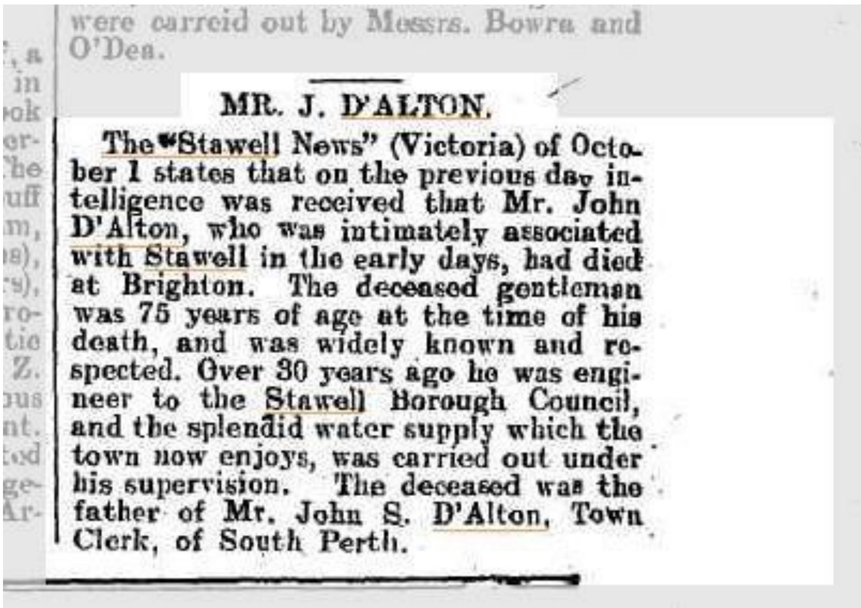
[26] [*The Argus* newspaper, Melbourne, Tuesday 30 March 1880, p3g.

contain 2,500,000 gallons. The basin is bricked throughout, and coped with granite. When finished, the reticulation pipes were down and the water laid on to the houses of several of the burgesses. This was supplied by the drainage from the eastern end of the tunnel alone, and was found, during most of the months of the year, to be far more than was required for domestic purposes. From this source the dams of the mill-owners and the engines were supplied, and subsequently baths were built and filled, and the streets watered by it. During the months of December and January last, however, the drainage began to show signs of decreasing, and had it not been for the vigorous action of the borough council there would have been a water famine for a short season. The first rain which broke the last drought removed all anxiety on this score, and now there is as plentiful supply as the inhabitants could desire. It is the intention of the engineer to dam up the western end of the tunnel, so as throw all the drainage Stawell-wards, and this will, of course give a most abundant supply. The cost of all the machinery connected with the tunnel, including Ford's borer, tools, and repairs is $2,777, the whole length from face to face of the mountain being 3,300ft , and the average cost of tunnelling per foot $4 10s. 3d. making the cost of the whole tunnel $14,920. The highest rate of progress made by the rock boring machinery at any time was 82ft. per month. From the western mouth to Fyans Creek the distance is as I have before stated, six miles. This will be flumed by iron fluming on wooden horses. Fyans Creek is one that has never been known to cease running. It is estimated to discharge 1,700,000 gallons daily in the driest seasons, and in winter this increases to 10,000,000 gallons. The water has been pronounced to be singularly pure by the Government analytical chemist although the machinists here state that the boilers of their engines show perceptible evidence of the traces of iron. The contractors for conveying the fluming, which was made at the local foundry, to its destination, are now busy carting it, and it is estimated that it will not be erected before 12 or 18 months, at the expiration of which time the scheme will be complete in every respect. It may be interesting to some of your readers to know that the time in actual work taken to put the tunnel through was three years and five months, and that the length of drill holes put in during the time amounted to 77,606ft. The engineer states that when the whole is completed 10,000,000 gallons of water per day will be delivered on Stawell, that being the capacity of the mains, which will be tried to the utmost to do this. The supply from both ends of the tunnel as it now is will be 110,000 gallons per day. Allowing at the rate of 25 gallons per head of the population, which is the average calculated on in the manufacturing towns of England, the Stawell water scheme when finished would supply a population of 40,000 people. The whole cost of the scheme will be as follows:—

15 miles of mains including carriage and other expenses	£56,978	6	11
Reticulation	10,145	3	10
Tunnel	14,920	3	11
Service reservoir	2,118	19	8
Fluming up to the present time, and head weir	6,036	15	9
Further fluming required, say	3,000	0	0
Purchase of land, and preliminary expenses _	1,071	19	2
Supervision, surveying, &c.	3,666	14	5
Further reticulation, say	2,000	0	0
	£99,938	3	8

This with interest added, and other expenses at present unconsidered, will amount to $108,000. Of this amount $98,000 has already been obtained from the Government, and paid away by the borough council. There are at present 130 houses supplied with water, the charge being 1s. 6d. per 1,000 gal. to householders, and 1s. per 1,000 to machines. It is expected that the whole supply will be fully utilised, as it will be quite possible to supply miners who are on the alluvial diggings surrounding with sufficient water for sluicing purposes, while it is almost a certainty that private crushing plants will be erected to supply the requirements

of each group of mines. In the mining uses for which the supply will be available, it is expected that a great impetus will be given to the prosperity of this goldfield.



were carreid out by Messrs. Bowra and O'Dea.

MR. J. D'ALTON.

The "Stawell News" (Victoria) of October 1 states that on the previous day intelligence was received that Mr. John D'Alton, who was intimately associated with Stawell in the early days, had died at Brighton. The deceased gentleman was 75 years of age at the time of his death, and was widely known and respected. Over 30 years ago he was engineer to the Stawell Borough Council, and the splendid water supply which the town now enjoys, was carried out under his supervision. The deceased was the father of Mr. John S. D'Alton, Town Clerk, of South Perth.

Figure A3.1: John D'Alton's obituary, 1904

Source: Trove, Western Mail newspaper, 15 October 1904, page 22

APPENDIX 4 History of Responsibilities for Water Supply to Stawell

CHRONOLOGICAL SUMMARY OF AUTHORITIES AND WATER SUPPLY SCHEME LEGAL BODIES

1858 Proclamation of Town of Stawell [the surveyed area, not the Council]

1860 The Victorian Parliament passes a law allocating money to six Mining Districts. Stawell builds two reservoirs dependent on runoff, one on side of Big Hill and the other at the lower end of township.

29 Jan 1861 "The Stawell Road District" proclaimed by Gazettal.

26 Feb 1861 First meeting held of The Stawell Road District Board.

30 Dec 1864 Proclamation of **Shire of Stawell** by gazettal under the Local Government Act 1863. [The area was the same as "The Stawell Road District"]

1868 The Pleasant Creek Waterworks & Tramway Company formed with the purpose of constructing a pipeline to bring water from the lower Fyans valley in the Grampians to Stawell. Lack of Government support to subsidise the private company, whose shareholding was over $40,000 pounds, leads to the company folding.

23 Sep 1869 The Stawell Shire Council forms a Water Commission sub-committee of the whole Council to investigate a number of alternative water supply ideas.

15 Nov 1869 The township of Stawell [the area] was excised from the Shire of Stawell to form the **Borough of Stawell**

1869 John D'Alton was appointed the first Stawell Borough Engineer and continues the investigation of a number of water supply proposals with a new Water Supply Committee established by the Borough Council.

1869 to 1871 Sees the investigation of various water supply options, but it wasn't until the period **1872 to 1874** that the design and planning of the Stawell Water Supply project progressed for the Grampians / Fyans Creek scheme. [Also known as the GlenFyans Scheme by D'Alton]

10 Sep 1874 Application made by Borough of Stawell for loan of 84,500 pounds for the Stawell Water Supply scheme.

26 Oct 1874 First meeting for the Stawell Water Supply District.

18 Feb 1875 Construction of Stawell water supply project starts.

1957 Town of Stawell Waterworks District assumed responsibility for Borough of Stawell Water Supply District

1984 Stawell Water Board assumed responsibility from Stawell Town Council.

1995 Grampians Water assumed responsibility from Stawell Water Board.

2004 Grampians Wimmera Mallee Water assumed responsibility from Grampians Water.

SEPARATE SHIRE OF STAWELL AUTHORITIES

6 Jun 1882 Along with adjoining Shires, the Shire of Stawell joins the Wimmera United Waterworks Trust to cover a strip of land in the North East Riding near the Richardson River.

7Aug 1882 The Shire of Stawell Waterworks Trust was constituted to cover the remainder of the North East Riding.

20 Nov 1900 The original Shire of Stawell Waterworks Trust struck its last rate. No meeting of the Trust was held from 7 Feb 1905 until 4 Jul 1950.

20 Feb 1951 Waterworks district extended to include Glenorchy and Halls Gap.

12 Mar 1951 Waterworks district extended to include Great Western.

17 Apr 1951 Glenorchy and Halls Gap Urban Districts proclaimed for provision of a reticulated water supply. Previously some properties at Glenorchy had been supplied from a scheme originally operated by the Victorian Railways.

8 Apr 1952 Great Western Urban Districts proclaimed for provision of a reticulated water supply.

1957 Water supply became available to consumers in Great Western, Glenorchy and Halls Gap.

1984 Stawell Water Board assumed responsibility from Shire of Stawell.

1995 Grampians Water assumed responsibility from Stawell Water Board.

2004 Grampians Wimmera Mallee Water assumed responsibility from Grampians Water.

Allan E Ralph
Dip CE, CE, MIEAust, Fellow IPWEA
Contract Engineer
24 Feb 2014

APPENDIX 5 Letter from John D'Alton re Rock Boring at Stawell [27]

ROCK-BORING AT STAWELL.

The following is a copy of a letter received from Mr. John D'Alton, engineer to the Stawell Waterworks, containing his opinion of the rock boring machinery employed there, and reporting progress made :-

Engineer's Office Stawell Waterworks,
Town Hall, Stawell, October 6, 1879.

R. G. Ford, Railway Department, Melbourne.

Dear Sir, - With reference to the action of your rock drill and other machinery working at the Grampians tunnel, Stawell Waterworks, I have much pleasure in forwarding the following particulars :-

The machinery consists of a 10 hp engine and boiler, double air compressor, foul air exhauster and three rock boring machines. The whole has been working night and day for upwards of 75 weeks, the air compressor keeping up a pressure of from 75lb. to 100lb. per square inch, and with the exception of changing, the piston-leathers once, required no other repairs. The whole of the machinery has given me much satisfaction.

The three rock drills have done throughout most efficient work in the face of very discouraging circumstances in fact but for their aid the tunnel would probably have been abandoned at about 400ft. from the eastern side of the hill where the last hand labour at that end was employed. The extreme hardness and intractability of the rock there encountered exceeded anything I have met with either in my home or colonial experience of mining which extends over a period of 30 years. The description of rock referred to continued with little alteration over a distance of 600ft., giving out at intervals great quantities of water, often exceeding 120,000 gallons per day and never less than 70,000. This alone would be sufficient to make the progress of the drive slower than it otherwise would be.

With respect to the work done in the time before mentioned, I shall simply give you an extract from my report to the Stawell Borough Council on the subject, dated 1st October, 1879; the time referred to being up to the 13th September 1879.

The time worked by machinery was 75 weeks, and the distance driven in that period was 815 ft.; the average per week for the whole time being 10ft 10½in. The cost of the above work (not including the erection of machinery) was $3,976 2s. 6d., or an average of £4 17s. 7d. per foot.

Taking the work done by Hill and party at the east side (where the machinery is now starting and which was the last done before starting the rock-drills, I find their average for two months was at the rate of 3ft. 6in. per week, so that had hand labour continued, it would have taken four years and twenty four weeks to complete what has been done by the rock drills in seventy five weeks. The present rate by machinery is 16ft. per week, cost being $3 4s. per foot.

Another matter I may allude to is the recent improvements you have introduced, which simplifies greatly the management of the machines and saves much time particularly in changing the drills and shifting the machine.

---

[27] The Argus newspaper, Melbourne, 22 October 1879, page 7.

I must not pass over your admirable foul air exhauster which has been of great service in clearing out the dynamite fumes and preventing loss of time after firing.

As an example of the hardness of the stone driven through in this tunnel, I may state that a specimen forwarded to the Railway department was tested by the diamond drill, and the bit was spoiled in boring to a depth of 3in.

I remain, dear sir, faithfully yours,
JOHN D'ALTON,
Engineer to the Stawell Waterworks.

APPENDIX 6 Robert Gray Ford – A man before his time! [28]

By JAMES A. LERK

Have you ever heard the sound of a hammer striking hot metal on an anvil? Each different weight anvil has its own tone, just as the hammer which is used, can create its own sound; governed in part by the temperature of the metal being struck. Blacksmithing as an occupation, is as old as the Iron Age. From the time of Vulcan and Tubal Cain up until the late 18th Century the role of the blacksmith in society did not change a great deal across many and varied cultures but with the beginnings of the industrial revolution in England blacksmiths became increasingly important in the manufacture of a plethora of tools and equipment from iron and its immediate derivatives.

Early days and training

Robert Ford, the father of our subject Robert Gray Ford was a blacksmith, living at Gateshead, Durham, England. He practiced his considerable skills of his craft for the manufacture of large components as well as very delicate ones. His son, Robert Gray Ford was christened on 18th August 1833 and was the eldest child, having a younger brother Michael and sister Jane. Robert Gray Ford was apprenticed as a blacksmith at an early age, in the Newcastle-upon-Tyne area. He completed his indenture by the time he was 17 years of age.

During Robert Gray Ford's apprenticeship, the railway boom that gripped England was still in full swing. Blacksmiths were in high demand as more and more a variety of work was required of them for railways. They could forge-weld metal, rivet, manufacture boilers and pressure vessels, be involved in finishing castings for machinery and increasingly interpret and make components from mechanical drawings. These were the skills that our subject had acquired before he was attracted to the colony of Victoria, most likely, because of the discovery of gold.

Robert Gray Ford was a self-funded passenger, on the ship *Ellen* that docked at Melbourne in October 1852.[1] At the time of his arrival one percent of the Victorian population was involved in the metal or engineering trades.[2] With the upheaval of the gold rush and the increasing demand for the skills of blacksmiths, the likes of Ford would have had no difficulty in securing work. Unfortunately, at this point no employment records have been located as to his work involvement. Ford married Mary Walker at Melbourne in March 1853. He must have found employment in his own field sufficiently remunerative to motivate both his parents and siblings to join him in the colony. By the time that the ship *Carpentaria* had docked in Melbourne from Liverpool on the 12th of May 1854[3], Ford was already engaged in acquiring new skills.

---

[28] Journal of Australasian Mining History, Vol. 3, September 2005.

Entrepreneurial flare

It is highly likely from the evidence researched to date that he became associated with the surveying and construction of the Geelong to Melbourne Railway Company line. In 1852 engineer/surveyor Edward Snell joined the company, his knowledge, bravado and entrepreneurial flair assisted in raising the profile of this private enterprise initiative.[4] The same qualities demonstrated by Snell were also evident when Ford later secured a position with the Victorian Railways.

Robert Ford senior had settled in Geelong and opened an engineering business and foundry at Victoria Terrace with his son Robert Gray Ford. The advertisement read, 'To Contractors, Agriculturists, and Others, R. Ford and Son, Engineers, Iron and Brass Founders, Boiler makers &c.' They went on to list steam engines, boilers, pumps, cast and wrought iron pipes, pallisading and grating, puddling mills, quartz crushers, stampers and horse powers made and fitted for the diggings.[5] This was 1858 and the diggings referred to were Ballarat.

The business partnership did not last and by mutual consent Robert Gray Ford was to withdraw. For some time afterwards, Ford senior won a number of contracts for the supply of various components for works by public bodies. What Robert Gray Ford did at this point remains a mystery but by 1860, it is known that he was living in North Melbourne, the address given when he applied for his first patent on the 25th of August for, 'Ford's Improved Apparatus for Building and Lifting etcetera.'[6]

Ford's Lifting Apparatus's patent drawings, illustrate his lifting device raising an iron viaduct girder. It is my belief that he submitted this patent with future employment specifically in mind. Soon after the patent application submission Robert Gray Ford was appointed in 1860 as, 'superintending the erection of the ironwork of the Moorabool Viaduct.'[7] The Moorabool Viaduct is one of the early Victorian Railways engineering marvels. This viaduct is 396 metres in length and up to 35.1 metres above the Moorabool River valley. The viaduct's design came from prominent railway engineer I.K. Brunel and the trusses were of the Warren type, open lattice. Engineer in Chief of this project was Robert Watson, who Ford was to have a close association with as a colleague in his subsequent career.

Robert Gray Ford was on board the first train to cross the Moorabool Viaduct, the second train carried the Governor and suite and on 10th of April 1862, en route to Ballarat, he joined in the banquet marking the opening of the Geelong Ballarat line.

From this time on Ford was always referred to as an engineer. On 13th April 1863, Robert applied for his second patent, number 620, 'For securing railway chairs to sleepers by means of tubular wrought iron or steel treenails'. His address at the time of this patent application was given as Geelong. At the time the young Ford family had just moved to Sandhurst, as Bendigo was once called.[8]

Mining Opportunities

A rented house was where the Ford's lived, just to the immediate north of the city centre, an area favoured by the establishment. Only a few blocks away was one of Bendigo's leading gold mines, there was something similar in railway and mining development that was not lost on Robert Gray Ford as railway work needed cuttings and tunnels as did mining. Over a three year period, beginning in 1864, Ford began the task of developing his ideas for a rock boring machine.[9]

As a servant in the engineering and surveying branch of the railways, Ford had limited spare time in which to develop his drill. 'Ford's Rock Boring Machine' was patented on the 23rd of February 1867, its patent number being 989. Now that the patent had been accepted his next task was to have a prototype manufactured from his drawings. Ford realised that an innovative machine such as his, that was different from any other, required a foundry and engineering works that had a sound record for

manufacturing machinery. He selected Vivian's Foundry at Castlemaine as he knew of their high standard of expertise in engineering[10] as compared to the Bendigo foundries in the same period.

Ford must have come to some financial arrangement with Vivian's in respect of the cost of manufacturing one of his rock borers. A man on a salary such as his position carried, was unlikely to have the necessary capital on his own account to fund such a project himself.

By early April 1868, a prototype of the rock borer was ready to be demonstrated at Vivian's Foundry, where the required air pump or compressor and air receiver were available. Astutely, Ford made certain that the people who would be instrumental in the possible purchase of his machine were invited to the demonstration. Over 20 gentlemen from the mining industry, and the Department of Victorian Water supply were able to witness the drill in action.

Temporary would be the best description of the way the demonstration was conducted. Relatively small blocks of stone, about half a ton weight each; both blue stone and granite were on hand, to be drilled into. The blocks of stone were about 300mm thick, and these were drilled through in less than five minutes. The speed of the drilling impressed the engineer from the Victorian Water Supply as well as the mining men who were present.[11] The weight of the drill was 54.43 kg and it could be operated by a strong person without the need to have it mounted. Ideally, as in the case with the drill being demonstrated, it was mounted on a baulk of timber.

A second demonstration had been arranged for Ford's drill, this time a large contingent of mining men from Sandhurst came to Castlemaine to see the drill in action. Others from Tarrengower (Maldon) and Castlemaine were also on hand. Following this demonstration, which generated considerable interest, the Bendigo mining men were spurred on to form a Subscription Committee so that a drilling machine could be tested in a mining environment.[12]

Two of Ford's near neighbours, Latham and Watson, were the proprietors of the nearby Hustler's Reef Mine and instrumental in the process of supporting the formation of the Subscription Committee. Some time elapsed before the Subscription Committee had everything in hand for a drill to be manufactured by Vivian's, as well as a venue secured for its practical mining trial. The mine, which was made available, was Latham and Watson's Hustler's Reef Mine. Their mine manager, Joseph Millin played a key role in organising the Subscription Committee and the trial of Ford's Rock Borer.

On the 2nd of October 1868, the train from Castlemaine carried the long awaited drill. The machine was put on public display before being taken to the Hustler's Reef Mine. The rock borer was set to work in the mine for some time before the official demonstration. On the 5th of November 1868, Joseph Millin the host manager took a party of five in several trips by cage, including Ford, to the 183metre level of the mine. One of the mine's engine drivers, Samuel White, was the drill operator. The demonstration proved to be very successful, the drill having been mounted in a small crosscut, where slate, sandstone and quartz were bored. In the coming months, with regular use all would see if the machine was indeed a practical one.[13]

Robert Gray Ford could see ways to improve his rock borer and he submitted for patents numbers 1197 and 1197A to that effect on 11th December 1868. Rock boring machines require compressed air and the first compressor that Ford had made was almost a direct copy of that from George Low a Scottish engineer. One of Low's compressors and drills had been imported to Victoria for the Tarrengower Tunnel Company at Maldon in 1869.[14] Humble and Nicholson's Foundry of Geelong manufactured the first of Ford's compressors. Ford soon designed another compressor, which worked on the same principle as that of Low. These new improved compressors were to become the most common in Victoria for at least two decades. The compressors and rock boring machines were adopted for many projects including tunnelling for the Rocky Mountain Extended Gold Sluicing Company, Beechworth in 1879, a project 1,097metres long, and the Stawell Water Works tunnel in

1875. Others too adopted the Ford drill, including numerous quarries, the Isis Mine of Stuart Mill and the Albion Quartz Mine at Steiglitz.

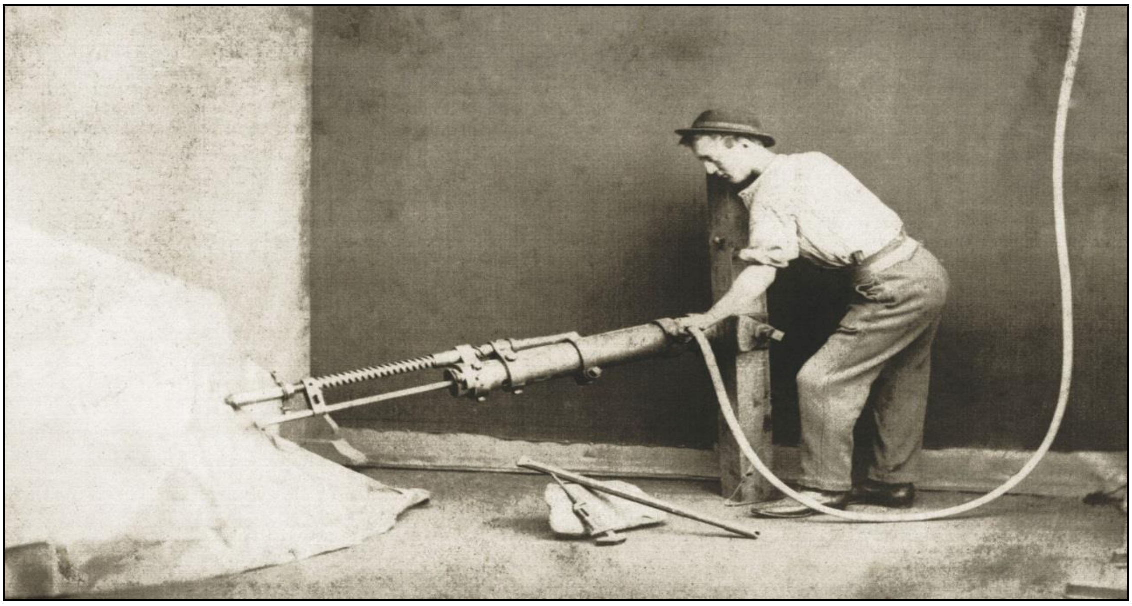
Ford saw a need for an exhauster to take away noxious fumes from explosives such as dynamite and for this purpose he invented and had manufactured his Patent

Exhausters. This exhauster received praise for its efficacy.[15]

Robert Gray Ford's career saw advancement, as he was promoted to the position of Engineer for Construction with the Victorian Railways on 20th March 1878. He was to be very closely associated again with Robert Watson, Engineer in Chief, who was his immediate superior. For a man who had been a blacksmith Ford had done well. Unfortunately those colleagues around him over whom he had a supervisory role had a different background and training, and to have someone such as Ford alter their designs was an anathema. The jealousy that existed festered in the area over which Ford had control. For a number of years the lack of goodwill continued, eventually leading to charges being laid against him at the highest political level, of incompetence and maladministration. This situation was brought to a head in 1862, when the Victorian Parliament appointed a 'Board to Enquire Into Certain Charges Brought Against R.G.Ford'.[16] The Board in its findings exonerated Robert Gray Ford of the charges laid; however, they did state 'that he was somewhat gruff to those under him.'

In his work capacity, Ford was as the enquiry revealed, highly talented, inventive, uncorruptable, well organised, conscientious, capable, very hard working and saved the Department through his initiatives a great deal of money. During these turbulent times Ford still managed to exhibit his inventions in a variety of Inter Colonial and International Exhibitions, gaining favourable comments from the juries in the different categories in which he had entered his work. At one of the exhibitions his Rock Boring Machine received a silver medal when it was pitted against two international rivals, the English Warsup and from the United States the Burleigh drill. In the allotted time, Ford's machine bored more than twice the depth of its nearest rival the Burleigh and over six times as much as the Warsup.[17]

Figure 1*: Robert Gray Ford with his rock drill, October 1868*



Photograph by B.P. Bachelder at Bendigo

Spreading his wings

The Melbourne Harbour Trust in 1878 had brought out the leading harbour engineer of the time, Sir John Coode to make recommendations for the improvement of the Harbour and the Yarra River that flowed into it. One of Coode's recommendations was the deepening of the mouth of the river where a large rock bar had to be removed. To answer this problem Robert Gray Ford invented his huge submarine drill. Two submarine drills with their 13.7metre high supporting pylons were mounted on twin barges along with the vertical boiler, air compressor, air receiver, winches and other machinery all of which was designed by Ford. For the purpose of the submarine drilling, Ford had also invented his Electric Blasting Apparatus for detonating the dynamite.[18]

Robert Gray Ford had invented a compressed air or steam powered Improved Winch, which could wind in mines for shaft sinking purposes at a rate of 20metres per minute under load. An air powered Pumping Engine, described as being ideal for shaft sinking was another efficient machine that came from Ford's inventive genius. This pump was designed to remove water at a rate of 2,250 litres to 45,000 litres per hour and throw it to any height required.

Yet another invention was R.G. Ford's Improved Patent Gas Compressor, described as being designed for compressing gas of high illuminating power such as acetylene, into the smallest possible bulk without fear of explosion. Again Ford believed that this gas compressor would serve a wide range of uses, including the illumination of mines, railway carriages, boats, and *etcetera*.

Following the Board of Enquiry into R.G. Ford in 1862, he transferred as an engineer to the Public Works Department, remaining there until 1888 when he retired to live at his home, Whitmuir Hall in East Brighton. He passed away there on the 22nd of November 1891, celebrated publicly with a very large funeral. Many newspapers carried an obituary and described Robert Gray Ford as 'a man before his time,' who was intellectually head and shoulders above his fellows.[19] A man of innate ability and great talent, he left an estate in cash of £10,000.[20]

*Paper presented at the Australian Mining History Association conference, Bendigo 10-14 July 2005

Endnotes

1 Immigration Fiche 13, p. 6, State Library of Victoria.

2 Victorian Census 1851.

3 The *Carpentaria* was of 1460 tons and specifically used as an immigrant ship.

4 Tom Griffiths and Alan Platt (eds), The Life and Adventures of Edward Snell, The Illustrated Diary of an Artist, Engineer and Adventurer in the Australian Colonies From 1849 to 1859, Angus & Robertson and the State Library of Victoria, 1988, p. xvi.

5 *Geelong Advertiser,* 20 November 1858, p. 4, column 6.

6 Patent number 368, Improved Apparatus for Building and Lifting etcetera.

7 Victorian Railways Newsletter, November 1936, p. 7.

8 At first called Bendigo Creek then Bendigo Diggings, it became Castleton in December 1852 and in January 1853 Sandhurst. Never a popular name, in 1891 this was changed by a vote of ratepayers back to Bendigo.

9 *Bendigo Advertiser,* 25 May 1868, p. 3, column 2.

[10] *Ibid.,* 1 June 1868, p. 2, column 5. [11] *Ibid.,* 4 April 1868, p. 2, column 1.

[12] *Ibid.,* 23 May 1868, p. 2, column 5.

[13] *Ibid.,* 6 November 1868, p. 2, column 4.

[14] Ralph W. Birrell, Australian Mining History Monographs Number 8, Rockdrills, Phthisis and Clean Air, Strathfieldsaye, 2002, p. 7.

[15] Harvey Nankervis, Manager for the Contractor Rocky Mountain Tunnel, Letter to R.G. Ford, 6 February, 1879, in Brochure, *R.G. Ford's Improved Patent Rock Boring Machine*, Fergusson & Moore, Melbourne, 1880, p. 4.

[16] Report, The Board Appointed to Enquire Into Certain Charges Brought Against Mr. R.G. Ford, Engineer For Construction, Victorian Railways, Minutes of Evidence and Appendices, Presented to Both Houses of Parliament By His Excellency's Command, Melbourne, 1882.

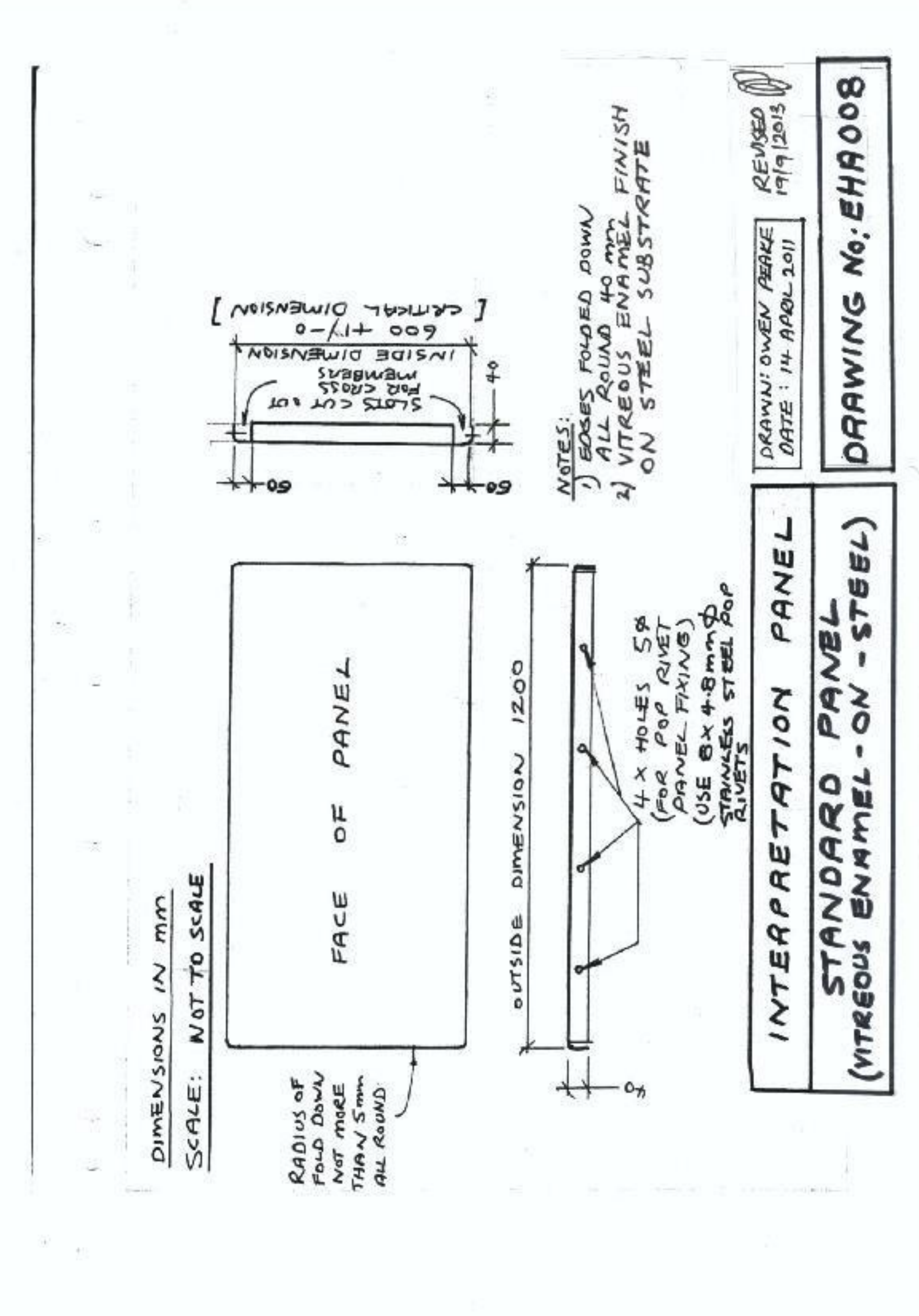
[17] Brochure, R.G. Ford's Improved Patent Rock Boring Machine, Melbourne, c.1880, p. 1.

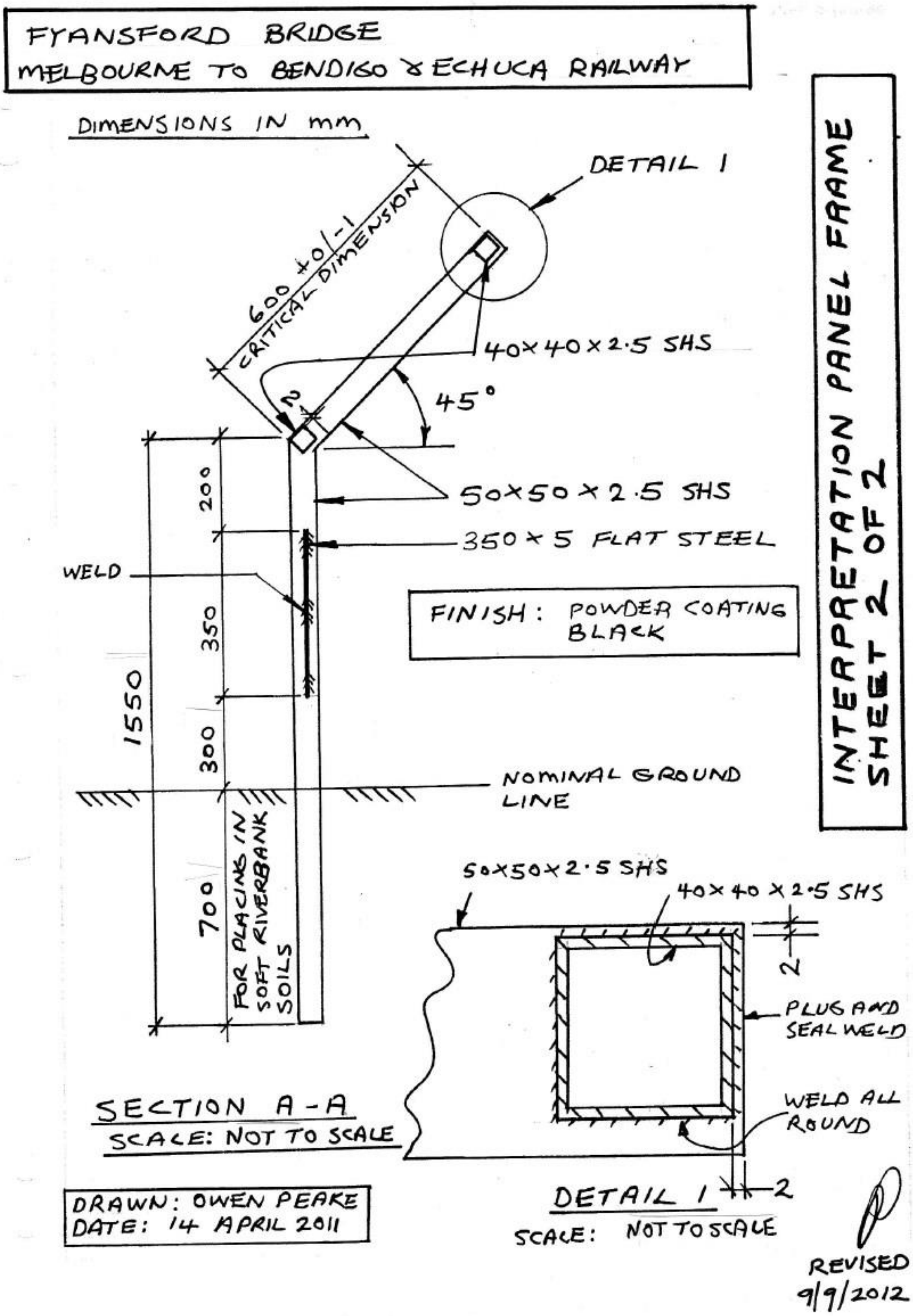
[18] All the work associated with the remodelling of the harbour was completed in 1886, see, A.J. Allan, *Victorian Historical Magazine, The Story of The River Yarra,* vol. XXII, no. 4, December 1940, p. 107.

[19] Brighton Southern Cross, 28 November 1891.

[20] James A. Lerk, Robert Gray Ford, Colonial Blacksmith, Inventor, Engineer and One Time Bendigonian, Golden Square, 2005, p. 48.

APPENDIX 7 Drawings of Interpretation Panel and Mounting Stand

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MELBOURNE TO BENDIGO & ECHUCA RAILWAY
DIMENSIONS IN mm
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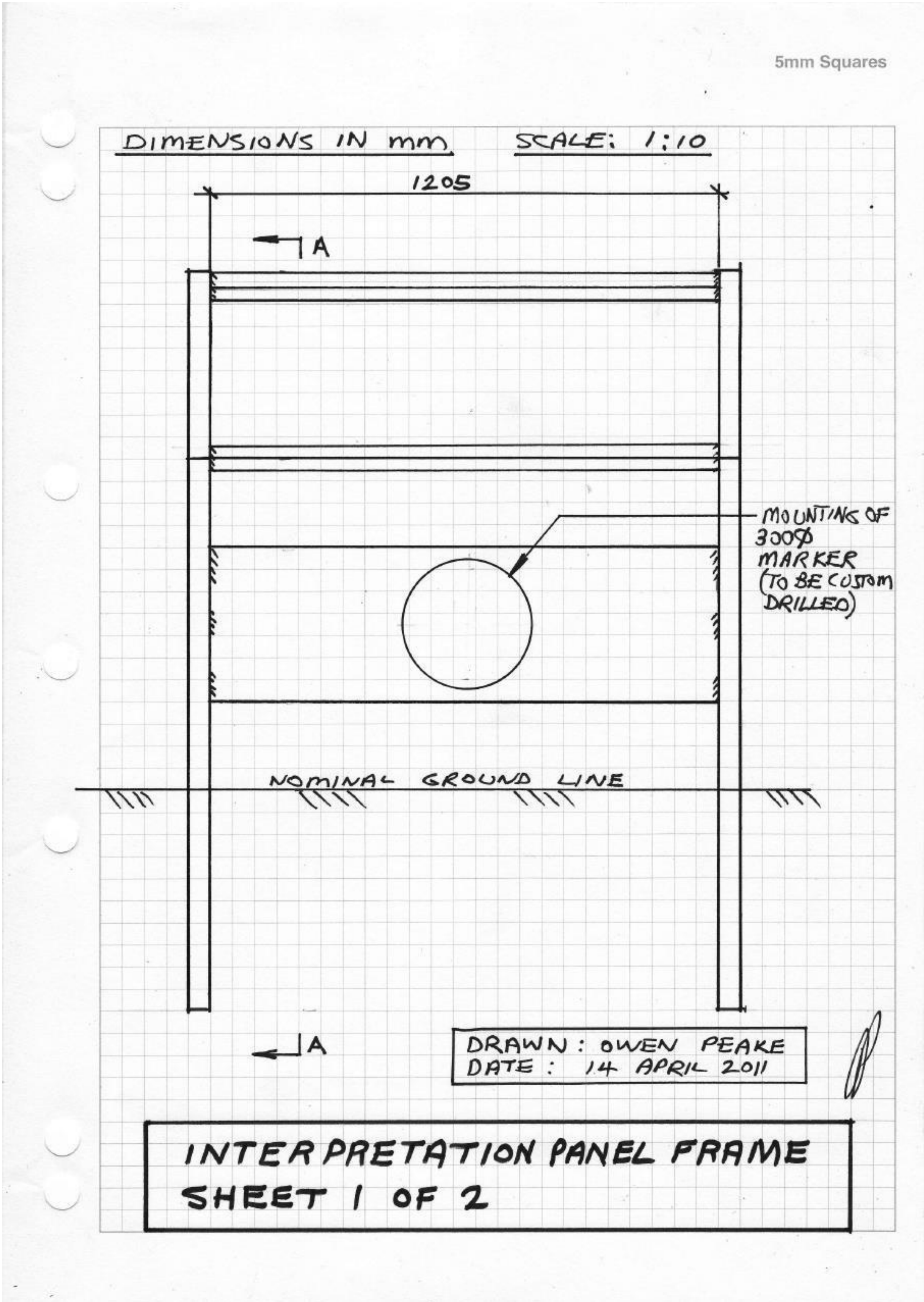
45°
2
50×50×2.5 SHS
350×5 FLAT STEEL
WELD
FINISH: POWDER COATING BLACK
200
350
300
1550
NOMINAL GROUND LINE
700
FOR PLACING IN SOFT RIVERBANK SOILS
INTERPRETATION PANEL FRAME
SHEET 2 OF 2
50×50×2.5 SHS
40×40×2.5 SHS
PLUG AND SEAL WELD
WELD ALL ROUND
SECTION A-A
SCALE: NOT TO SCALE
DETAIL 1
SCALE: NOT TO SCALE
DRAWN: OWEN PEAKE
DATE: 14 APRIL 2011
REVISED 9/9/2012



5mm Squares
DIMENSIONS IN mm
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MOUNTING OF 300Ø MARKER (TO BE CUSTOM DRILLED)
NOMINAL GROUND LINE
A
DRAWN: OWEN PEAKE
DATE: 14 APRIL 2011
INTERPRETATION PANEL FRAME
SHEET 1 OF 2

APPENDIX 8 Acknowledgments

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Great assistance was received by various people in the Horsham and Stawell area during the development of this document:

- Martin Duke
- David Eltringham
- Peter Jackson
- Marta Najfeld
- Darren Raeck, GWMWater
- Allan Ralph, Civil engineering and local government consultant, Stawell
- John Tottenham
- Suresh Unni

APPENDIX 9 Letters of Approval

Northern Grampians Shire Council

NORTHERN Grampians SHIRE COUNCIL

17 June 2014

Our Ref. No.: SM/KR
Our File No.: 07-03-001A
Enquiries: Sanjay (03) 5358 8700

Owen Peake
Chair, Engineering Heritage Victoria
4 Islington Street
Collingwood VIC 3066

Dear Peake,

Heritage Recognition of Stawell Water Supply Scheme 1881 by Engineers Australia (EA) and Engineering Heritage Victoria (EHV)

I am responding to your letter dated 28 May 2014 requesting support to assist with further recognition of the Stawell Water Supply Scheme.

Northern Grampian Shire Council would provide in principle support for the Heritage recognition of the Stawell Water Supply Scheme on the weekend of 11/12 October 2014. Council agrees to support the ceremonies at Halls Gap and Big Hill, and will supply a list of the names and details of the Councillors and senior staff who we would like to represent the Shire and be included in the invitation list.

Council agrees to contribute an amount of $2000 towards one of the panels, plus $1000 in kind for the fabrication of the stand and installation on site at Big Hill. Note that the location of the panel may be affected by any future mining proposal at that site, if it goes ahead. Please forward me a tax invoice to process the Council contribution.

Council will supply an electronic copy of their logo for use on the panels, and liaise with your graphic designer as required.

Should you have any further queries please do not hesitate to contact me on 5358 8700.

Yours faithfully

SANJAY MANIVASAGASIVAM
DIRECTOR INFRASTRUCTURE & ENVIRONMENT

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GWMWater

Our ref: 02/001/004-03: O2014/3804
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GWMWater

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Email: info@gwmwater.org.au
Website: www.gwmwater.org.au

Certified to best practice standards ISO 9001 / 14001 and AS/NZS 4801

1 August 2014

Mr Owen Peake
Chair
Engineering Heritage Victoria
4 Islington Street
COLLINGWOOD VIC 3066

Dear Mr Peake

Heritage Recognition of Stawell Water Supply Scheme

I refer to your letter dated 28 May 2014 regarding support for the recognition of the Stawell Water Supply and advise that GWMWater would be happy to contribute to the construction of the interpretation panel up to $3,000 in cost.

It is our understanding that the panels are being designed and constructed in Adelaide, it would be our preference from a financial prospective to arrange payment directly with the supplier to ensure compliance with our purchasing guidelines.

Could you please arrange for the supplier to confirm the price directly to Darren Raeck so that a purchase order can be prepared. Darren can be contacted at the above address, by email darren.raeck@gwmwater.org.au or direct phone 0408 315 710.

Yours sincerely

Andrew Rose
Acting Managing Director

CHANGE CONTROL

VERSION 1	**22 January 2014**		
VERSION 2	**25 JANUARY 2014**		**OP ADDED COMMENTS WITH TRACK CHANGES**
VERSION 3	**13 FEBRUARY 2014**		**FURTHER ADDITIONS AND CHANGES**
VERSION 4	**19 FEBRUARY 2014**		**OP ADDED COMMENTS AND TRACK CHANGES**
VERSION 5	**10 MARCHJ 2014**		**NEW VERSION SUBMITTED**
VERSION 6	**11 MARCH 2014**		**OP ADDED COMMENTS WITH TRACK CHANGES**
VERSION 7	**18 MARCH 2014**		**FINAL FROM KRISTINA & TRAVIS**
VERSION 8	**21 APRIL 2014**		**INCORPORATED JOHN TOTTENHAM SUGGESATIONS**
VERSION 9	**5 MAY 2014**	**10,800 WORDS**	**CHECKING AND EDITING**
VERSION 10	**6 MAY 2014**	**13,884 WORDS**	**ADDED PAPER ON ROBERT GRAY FORD APPENDIX 6 AND ADDITIONAL MAPS IN APPENXIX 1**
VERSION 11	**12 MAY 2014**	**14318 WORDS**	**CHANGED BACK TO WORD FROM PDF TO REDUCE SIZE OF FILE**
VERSION 12	**25 MAY 2014**	**14364 WORDS**	**PROOF READING INCORPORATED**
VERSION 13	**21 AUGUST 2014**	**14614 WORDS**	**ADDED SUMMARY OF MAJOR CHANGES TO SYSTEM (P9), TEXT CORRECTIONS P10/11, P19, REALIGHNED IMAGES PAGES 12, 13.**
VERSION 14	**21 AUGUST 2014**	**14614 WORDS**	**ADD INTERPRETATION PANEL IMAGES, APPROVAL LETTERS**